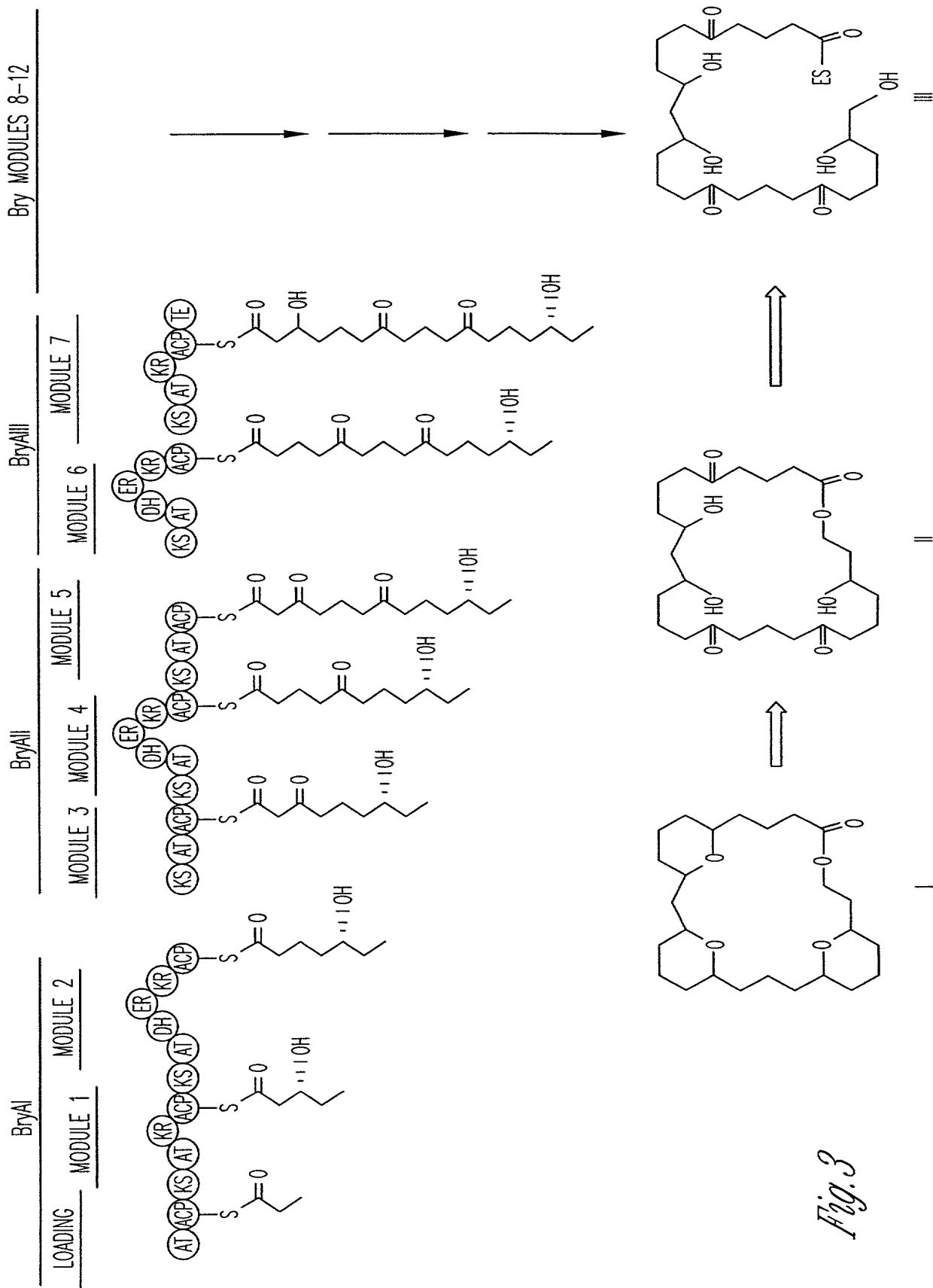
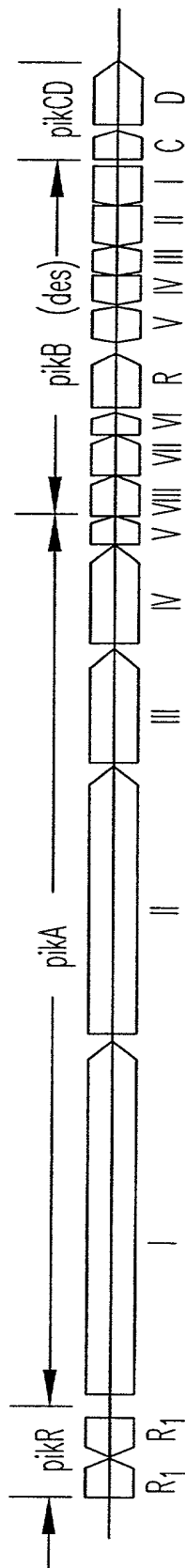


Fig. 2





GENE REPLACEMENT IN THE S.VENEZUELAE CHROMOSOME TO EXCHANGE
pik PKS GENES WITH bry PKS GENES

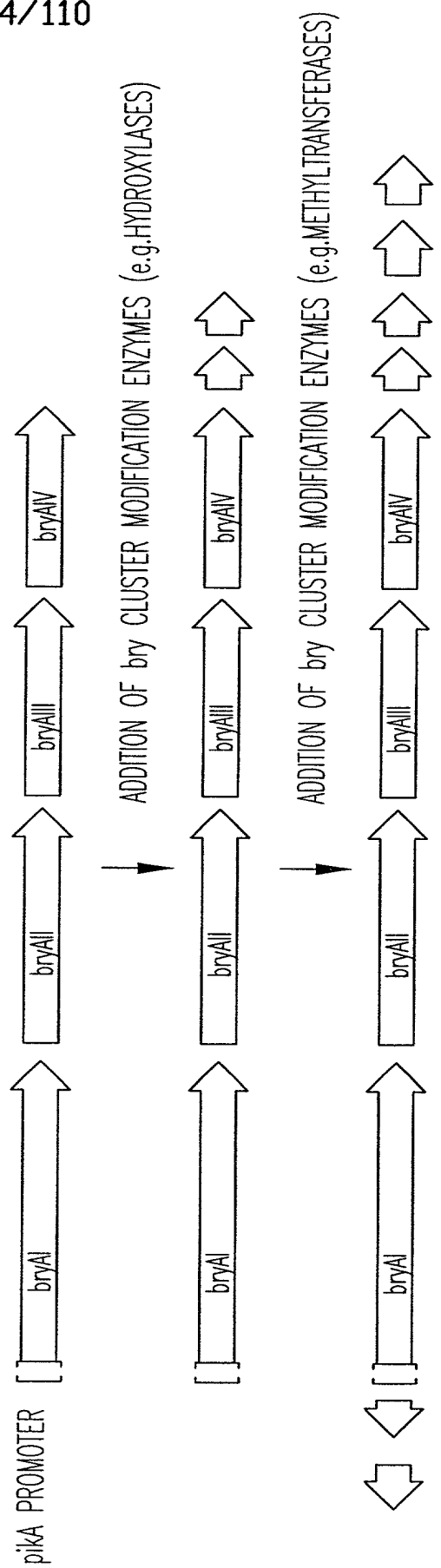
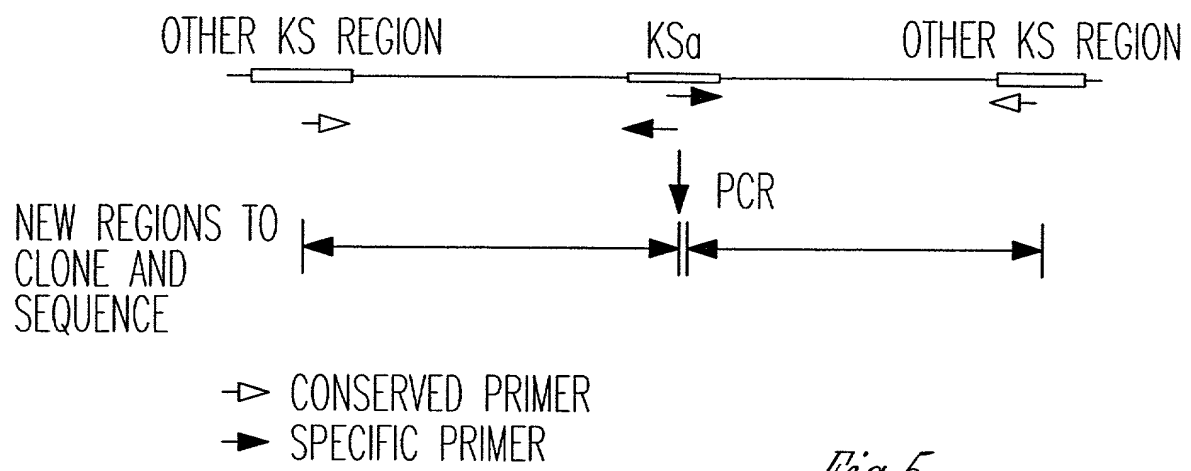


Fig. 4

*Fig. 5*

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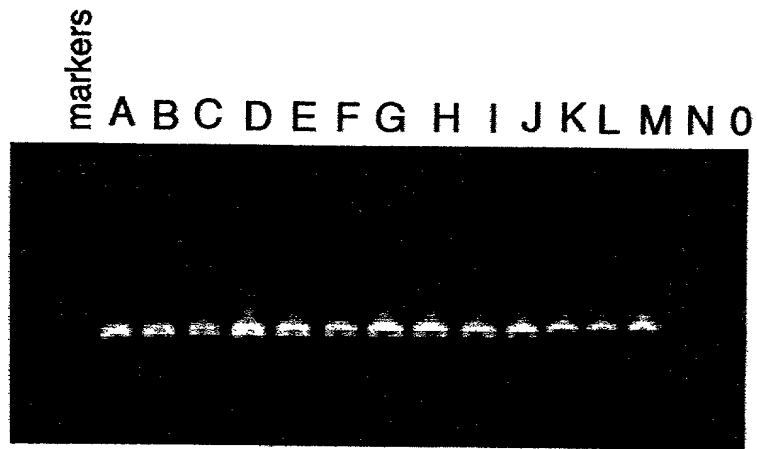


FIG. 6

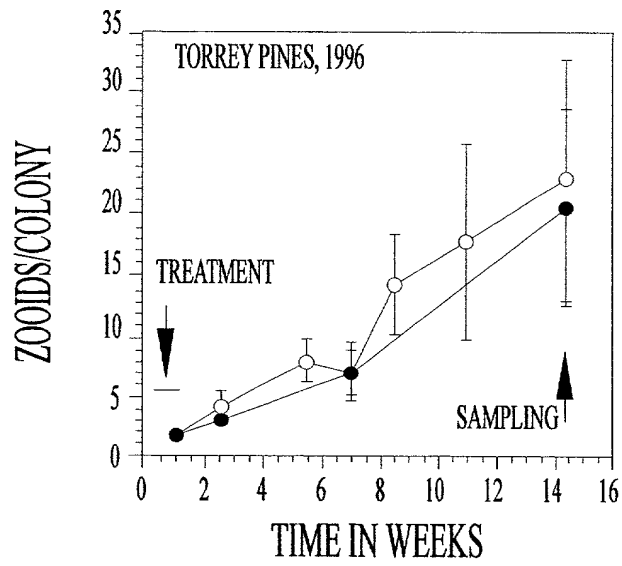
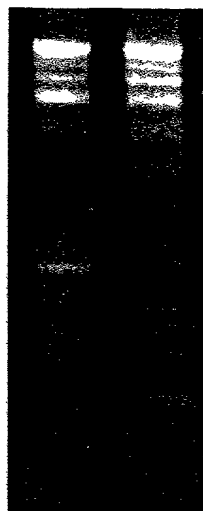


FIG. 7A

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Control Treated



DGGE

FIG. 7B

Control Treated



KSa Amplification

FIG. 7C

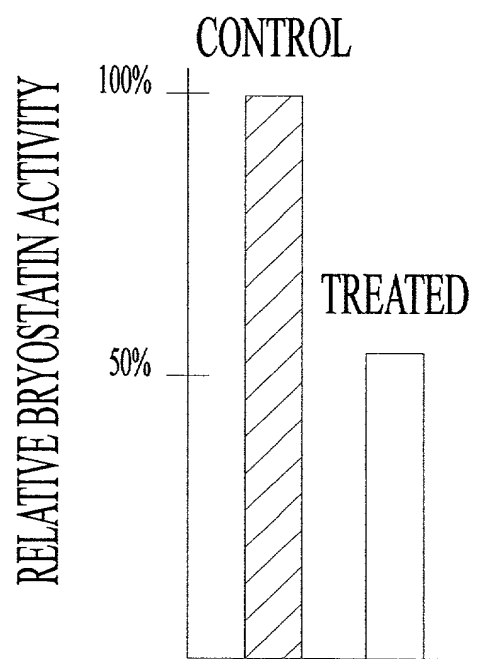


FIG. 7D

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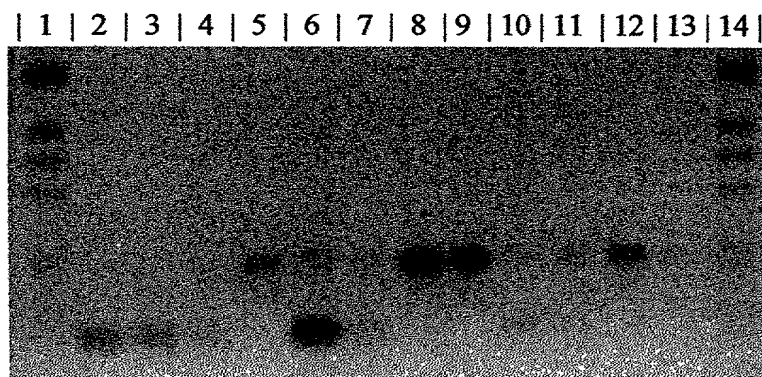


FIG. 8

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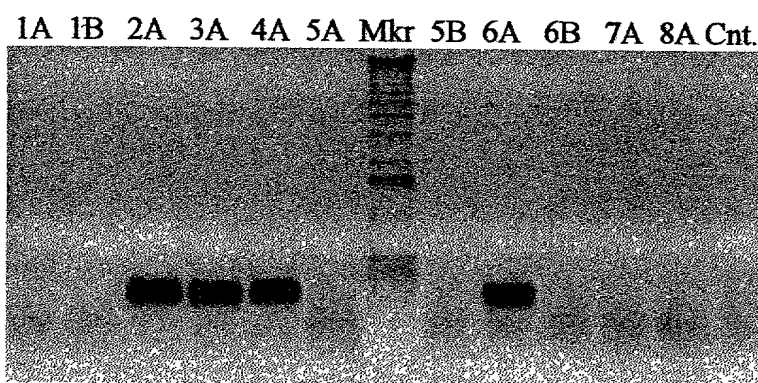


FIG. 9

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2A 3A Mkr. 4A 6A

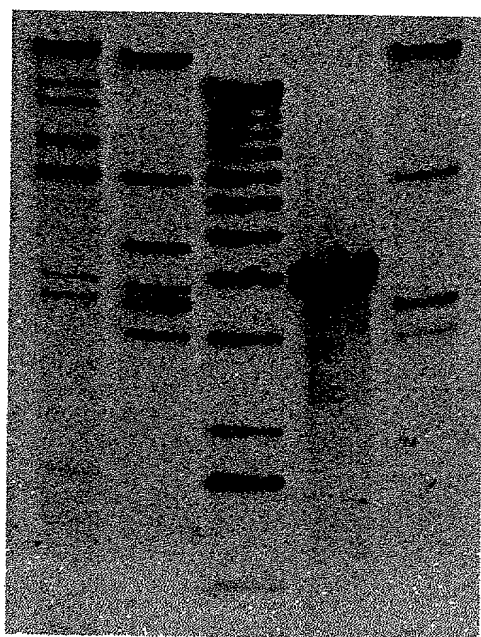


FIG. 10

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5A 5B 3A 6A

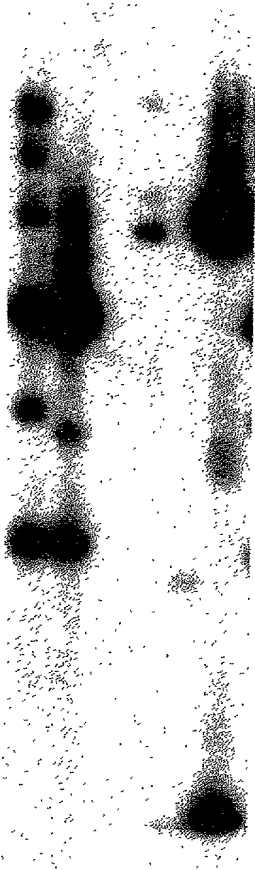


FIG. 11

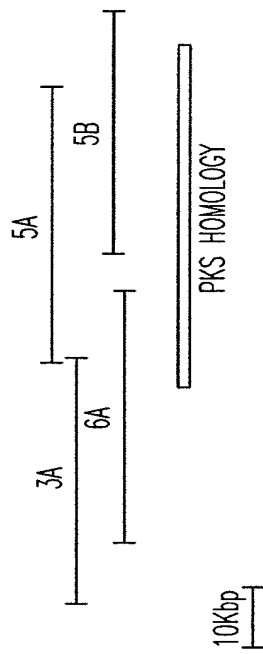


Fig. 12

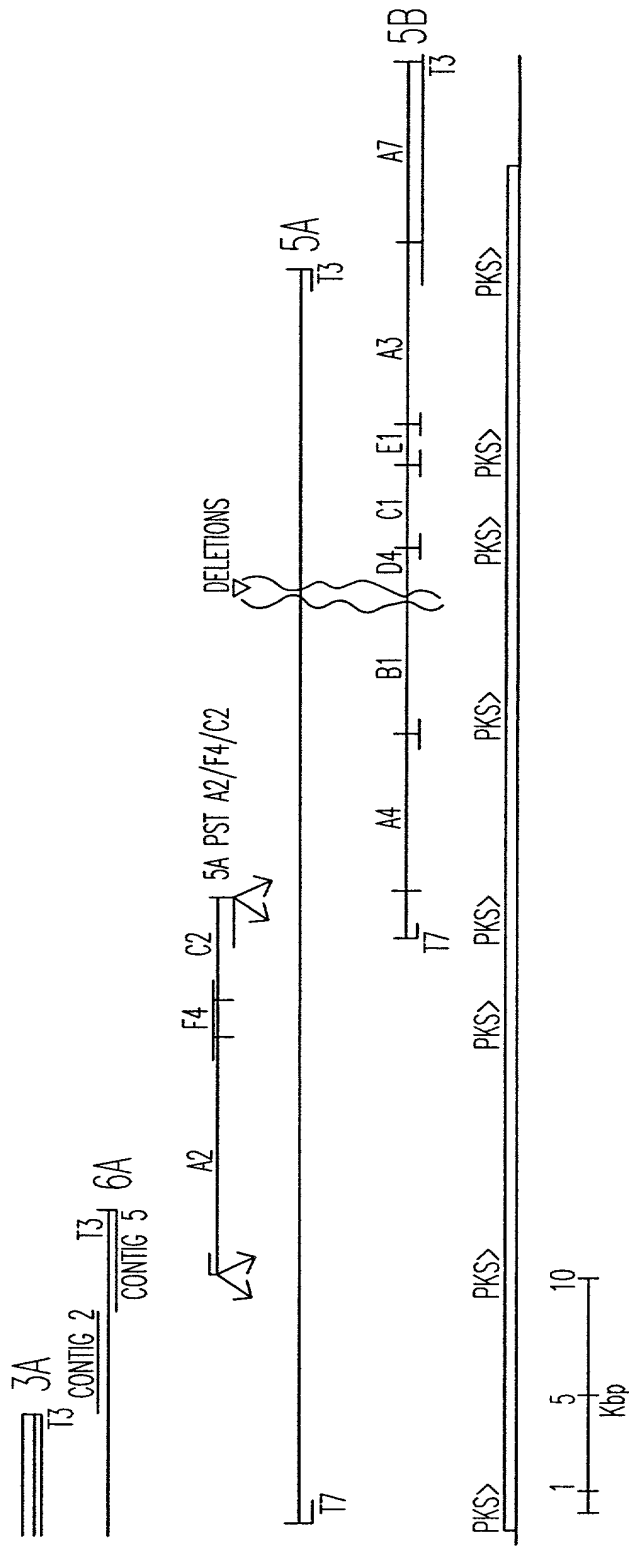


Fig. 13

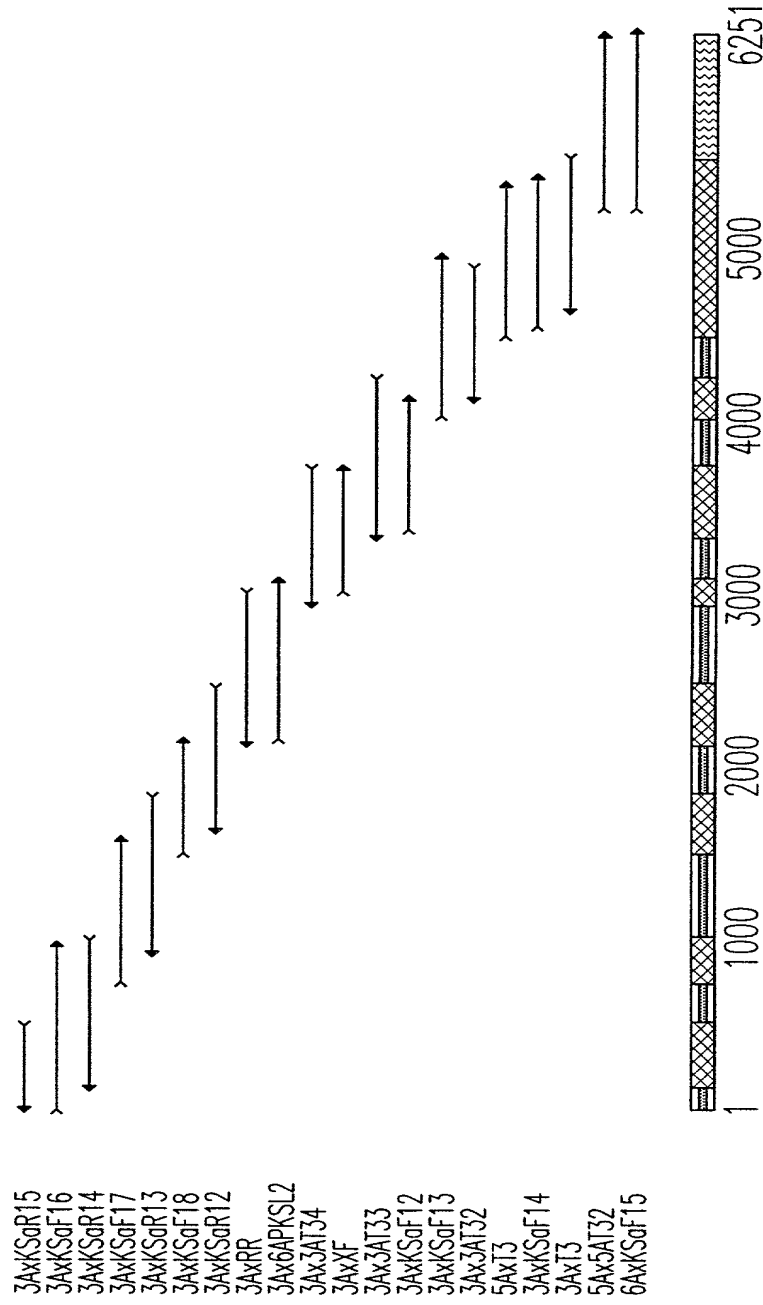


Fig. 14A

Nucleotide and Translated Amino Acid Sequence of PKS Cluster on Clone 3A

1	GAT	GGA	ACT	CAT	TAC	CAC	CCA	CAA	AAA	AGT	CCG	TTT	CTT	CAA	42
43	CGC	GGT	TGA	TTT	AAT	TAA	CCA	GCT	AAT	CAA	CGA	ACA	ACA	AAA	84
85	GCA	GCA	AAC	GGG	CAA	ACT	CAT	CAG	AGC	CTT	ATT	GCA	GGT	GGA	126
127	TTG	TTT	AAG	TAT	TGA	TGA	ACT	CGG	TTA	TAT	CCC	ATT	CCC	TAA	168
169	ATC	CGG	TGG	GGC	GTT	GCT	CTT	CCA	CCT	CAT	CAG	TAA	ACG	GTA	210
211	TGA	GAA	GAC	CAG	TAT	TAT	CAT	CAG	CAC	CAA	TCT	GGC	TTT	TGG	252
253	GGA	ATG	GAA	CAG	TGT	GTT	TGG	TGA	TGC	CAA	GAT	GAC	CAC	CGC	294
295	GTT	ATT	GGA	TCG	TAT	CAC	GCA	TCA	TTG	TTC	AAT	CAT	CGA	AAC	336
337	CAA	GCA	TGC	GTC	GTA	TCG	TTT	TAA	GCA	GAG	TCA	GAA	ACA	GAC	378

FIG 14B

379 ATG AAA GTA GCT TTC ACC GGT GGG ACA GTG TTA GAT GCA AAC 420
 <<<TRANSPOSASE ORF

421 CCC GGG TCA GCT TTA AGT GCA ATT TGA AAA CCA ATG TGA TAA 462

Possible transcription control sequences> -35 -10

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463  TTG TGG CTA AGA TCA ATA AAA ATA TTT TTT TAT TGA TTA 504
Inverted repeat>
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505 TGA TGA TCC ACG TTA AAA AAA ATA CTA TAA ATA TGA AAT AAT 546

547 ATT TCA ACT TTA TTT TTG ATG GTC GTT GTT GAG GAA TTT TTT 588

PKS ORF START>>>

Possible SD sequence

M V V V E E F F

589 GTG AGT TAT CGA GAT ATT TTG AAG GCT TTA CAG GAT GAA AAA 630
V S Y R D I L K A L Q D E K

631 ATT AGT TTT GAA GAG GCT AAA TAT AAG TTA ATA AAA AGA AAA 672
I S F E E A K Y K L I K R K

673 GAT AAA AAA TCA AAA CAG CGT TTA AAT CAT GAT CGT GAA TTA 714
D K K S K Q R L N H D R E L

FIG 14B (cont'd)

715 AAT CGA TCG ATG AAT ATT ACG CCA AAA ATA GTG AAT AAT TAC 756
N R S M N I T P K I V N N Y

757 GGT TTA GTA TTA TTG GGC GGT CAT TTA TTT GAA GAA CTC CGT 798
G L V L L G G H L F E E L R

799 CTG AGT GAA TGG AAA GCT GCC AAC CCT AAC CCT AAT GAA GTT 840
L S E W K A A N P N P N E V

841 AGC ATT CAG GTC AAG GCA TCC GCC ATT AGT TTT ACC GAT ACC 882
S I Q V K A A S A I S F T D T

883 TTG TGT GTA CAA GGT TTA TAT CCA TCA CAC TAT CCC TTT GTT 924
L C V Q G L Y P S H Y P F V

925 CCG GGC TTT GAA GTA TCG GGA GTG ATT CGT CAA GTG GGT GAA 966
P G G F E V S G V I R Q V G E

967 CAC ATA ACC GAC TTA CAC GTG GGT GAT GAA GTT ATT GCG TTC 1008
H I T D L H V G D E V I A F

1009 ACA GGA TCA TCA ATG GGA GGG CAT GCT GCC TAT GTG ACG GTG 1050
T G S S M G G H A A Y V T V

1051 CCA CAA GAT TAC GTG GTA CGA AAA CCC AAG GAC TTA TCT TTT 1092
P Q D Y V V R K P K D L S F

FIG 14B (cont'd)

1093	GAG GAT GCC TGT AGC TTC CCA TTG GCT TTT GCG ACC GTC TAT	1134
	E D A C S F P L A F A T V Y	
1135	CAC AGT TTT GCA CGG GGA AAA TTA TCT CAC AAC GAT CAT ATC	1176
	H S F A R G K L S H N D H I	
1177	TTG ATA CAA ACG GCG ACA GGT GGC TGT GGT TTG ATG GCA CTT	1218
	L I Q T A T G G C G C G L M A L	
1219	CAG TTG GCG CGT TTA AAG CAG TGT GTG TGT TAT GGG ACC TCC	1260
	Q L A R L K Q C V C Y G T S	
1261	AGC CGA GAA GAC AAG CTT GCA CTC CTC AAA CAG TGG GCA CTG	1302
	S R E D K L A L L K Q W A L	
1303	CCC TAC GTC TTC AAT TAT AAG ACG TGC AAT ATT GAT GAG GAG	1344
	P Y V F N Y K T C N I D E E	
1345	ATT CAA CGC GTC AGT GGT CAT CGA GGT GTC GAT GTC TTA	1386
	I Q R V S G H R G V D V V L	
1387	AAT ATG CTC CCA GGA GAG CAT ATA CAA GGG CTG AAT AGT	1428
	N M L P G E H I Q Q G L N S	
1429	TTA GCC AAG GGA GGC CGT TAT TTG GAA CTG TCG ATG CAT GGA	1470
	L A K G G R Y L E L S M H G	

FIG 14B (cont'd)

1471 TTG TTA ACG AAC GAA CCT GTC AGT CTG TCG TCT CTG CGT TTT 1512
L L T N E P V S L S S L R F

1513 AAT CAA TCC GTT CAA ACC ATC AAT TTA CTG GGG TTA CTC AAT 1554
N Q S V Q T I N L L G L L N

1555 AAG GGT GAT GAT GGC TTT ATC GGG TCT GTA TTA GCG CAA ATG 1596
K G D D G G F I F S V L A Q M

1597 GTT TCC TGG ATT GAA TCA GGT GAT TTA GTG TCA ACC GTG TCG 1638
V S W I E S G D L V S T V S

1639 CGT ATT TAT CCG TTG GAT CAG ATC GGT GAA GCG TTA CGT TAT 1680
R I Y P L D Q I G E A L R Y

1681 GTC TCT GAA GGG GAG CAT ATA GGT AAA GTC GTT GTG AGT CAT 1722
V S E G E H I G K V V S H

1723 ACA GCG ACA GAG CCG ATG GAT TGC AGA CAG CGC TGT ATT GAC 1764
T A T E P M D C R Q R C I D

1765 AAT GTA TTG AAG CAA GGG CAA ATG GCG GCC TTG ACC GCG ACA 1806
N V L K Q G Q M A A L T A T

1807 GGG GGA AAA AGC CGG GTG TGG GGT ACT GGT GTC AAT GAC 1848
G G K S R V W G G T G V N D

FIG 14B (cont'd)

2227 TGT GGG GTA TTT GTT GGG TGC GGT GCG AAT GAT TAC AGC GCT 2268
C G V F V G C G A N D Y S A

2269 CTA ATG AAC AGT AGC CAC TCA ACG AGT CTC GAA TTA ATG AAG 2310
L M N S S H S T S L E L M K

2311 GAA TTA GGC AAC AAC TCT TCC ATT TTA TCT GCA CGA ATC TCC 2352
E L G N N S S I L S A R I S

2353 TAC TTT TTA AAT TTA AAG GGC CCT TGT CTT GCG ATT GAT ACC 2394
Y F L N L L K G P C L A I D T

2395 GCA TGT TCT TCT TCA TTA GTG GCC ATT GCC GAG TCG TGT AAT 2436
A C S S S L V A I A E S C N

2437 AGT CTG GTG TTG GGT ACT AGT GAC TTG GCG TTG GCA GGT GGA 2478
S L V L G T S D L A L A G G

2479 GTG TTG CTG ATG CCA GGT CCA TCC TTA CAT ATA GGT TTG AGT 2520
V L L M P G P S L H I G L S

2521 CAT GGA GAA ATG TTA TCA GTA GAT GGT CGC TGC TTT ACC TTT 2562
H G E M L S V D G R C F T F

2563 GAC CAA CGG GCC AAC GGT TTT GTA CCT GGA GAG GGT GTC GGC 2604
D Q R A N G F V P G E G V G

2605 GTT GTC TTG TTA AAA CGC ATG TCG GAT GCG GTG CGT GAT GGT 2646
V V L L K R M S D A V R D G

2647 GAT CCC ATT CGT GCA GTG ATA CGG GGC TGG GGT GTG AAT CAG 2688
D P I R A V I R G W G V N Q

2689 GAT GGT AGA AGT AAT GGT ATT ACG GCG CCG AGT TCA AAA GCG 2730
D G R S N G I T A P S S K A

2731 CAA AGT GCT CTG GAG CAA GAG GTT TAT CAA CGT TTT AAT ATT 2772
Q S A L E Q E V Y Q R F N I

2773 GAT CCA TCG AGC ATT ACC TTA GTC GAA GCA CAC GGA ACG GGC 2814
D P S S I T L V E A H G T G

2815 ACC AAA TTG GGT GAT CCG ATA GAA GTC GAG GCA TTG GCA GAA 2856
T K L G D P I E V E A L A E

2857 TCG TTT CGA GTC TAT ACG GAC AAG CGT CAT TAC TGT GCT CTG 2898
S F R V Y T D K R H Y C A L

2899 GGG TCG GTA AAA AGT AAT ATT GGT CAT TTG GGG GTA GGT GCT 2940
G S V K S N I G H L G V G A

2941 GGG ATA GCG GGC GTG ACC AAA GTA TTG TTA TCT TTG CAG CAT 2982
G I A G V T K V L L S L Q H

2983 CGC ATG TTA CCA CCG ACG ATT CAT TGT GAG GAT GTA AAC CCA 3024
R M L P P T I H C E D V N P

3025 CAG ATT GCG TTG GAA GGT AGC CCC TTT TAT ATC AAT ACG GAA 3066
Q I A L E G S P F Y I N T E

3067 TTA AAG CCT TGG CAG TCT GGT GAC AGT ATA CCA CGA CGG GCT 3108
L K P W Q S G D S I P R R A

3109 GGT GTC AGT TCT TTT GGA TTT AGT GGT ACC AAT GCA CAT CTT 3150
G V S S S F G F S G T N A H L

3151 GTA TTG GAG GAA TAT CTT CCT CAC TCG ACA GGA ACA ATA GAG 3192
V L E E Y L P H S T G T I E

3193 TCG TTT GCT GCG AAT CAT GCA AGT ACA GTT ATT ATT CCT TTG 3234
S F A A N H A S T V I I P L

3235 TCA GCG AAA AGT CAT AAT AGT TTA TAC ACA TAT GCT CAA ACG 3276
S A K S H N S L Y T Y A Q T

3277 CTA TTG ATA TTT TTA AAA CGT AGT CAG GTT ACT GAC GCT AAA 3318
L L I F L K R S Q V T D A K

3319 AAA ATC ACA ATA GAT CAC ATG GAA TGT CGC TTG TAT TTA 3360
K I T I D H M E C R L L D L

3361 GCC TAT ACT TTG CAA GTG GGT CGC GAG GCA ATG GAC AAA CGG 3402
A Y T L Q V G R E A M D K R

3403 ATA AGT TTT ATT GTC AAC ACA AAG CAA GCA CTC GTG GAA AAG 3444
I S F I V N T K Q A L V E K

3445 CTA AAT GCT TTT CTA GAG AAG GAA AAG ACT ATA ACA GAC TGT 3486
L N A F L E K E K T I T D C

3487 TAC CAC TAT TTA TTT GAT AGT GAC AAA CCG TCT ACA GAA ATT 3528
Y H Y L F D S D K P S T E I

3529 TTC CGT TTA GAC GAA GAT GAC AAA GTA TTA ATA AAC AGC TGG 3570
F R L D E D D K V L I N S W

3571 ATA AGT CAA AGT CAA TAT CAC AAA TTA GCC GAA GCC TGG AGC 3612
I S Q S Q Y H K L A E A W S

3613 CAA GGA CTC GAT ATC GAC TGG ACG CTA CTC TAT ACC CAC TCA 3654
Q G L D I D W T L L Y T H S

3655 TCA ACC CCT CGT CGC ATT AGC CTG CCC ACG TAT CCC TTT GCC 3696
S T P R R I S L P T Y P F A

3697 AGA GAC CGC TAC TGG CTA CCA GAA AAA CCA CGC TAT AAC CGG 3738
R D R Y W L P E K P R Y N A

3739 GCT AAT CAT CCG GTA TCC AAC CAT CAA ACA ACC ACT CAG AAT 3780
 A N H P V S N H Q T T T Q N
 3781 CAC TCA CGC TTT GCC ATT GAT ACG GAT CAC GAT GTC GTT GCC 3822
 H S R F A I D T D H D V V A
 3823 GAG ATC ATG CAA AAG ACA CAT CAA CAG GAA CTG GAA CAA TGG 3864
 E I M Q K T H Q Q E L E Q W
 3865 TTA TTA AAA CTG TTG TTT GTG CAA TTG CAA CAT ATG GGA TTA 3906
 L L K L L L F V Q L Q H M G L
 3907 TTT CAA CAT CGT GTC TTT GAG ACA GCG ACC GCT CTA CGT CAA 3948
 F Q H R V F E T A T A L R Q
 3949 AGT GCA GGC ATC GTT GAT AAA TAT GAT CGC TGG TGG CAT GAG 3990
 S A G I V D K Y D R W W H E
 3991 TGT TTA AGC GTT TTA CAG GAT GCG GGT TAT CTT GAA TGG AAA 4032
 C L S V L Q D A G Y L E W K
 4033 GAC GAT AGC GTA GCC GCC GCA CAG GCA TTG GAG TCT GAA TCG 4074
 D D S V A A A Q A L E S S
 4075 CAA GAG GCA TGG TGG AGC CGA TGG AAC ACG GAG TAT AAG CAT 4116
 Q E A W W S R W N T E Y K H

FIG 14B (cont'd)

4117 TAC CAG AAT GAT CCG GAA AAA AAG ACG TTA GCG ATA TTG ATT 4158
Y Q N D P E K K T L A I L I

4159 AAC GAT TGC TTA CAG GCA TTA CCA GGG GTG TTA AGT GGT GAG 4200
N D C L Q A L P G V L S G E

4201 CAA TTA ATA ACG GAT ATT ATT TTC CCC AAT GGT TCG ATG GAG 4242
Q L I T D I I F P N G S M E

4243 AAA ATG GAA GGC TTA TAT AAA AAT AAG ATT GCA GAT TAT 4284
K M E G L Y K N N R I A D Y

4285 TGT AAT CAG TGT GTT GGA GAC CTG CTC GTC CAG TTT ATT GAA 4326
C N Q C V G D L L V Q F I E

4327 GCA CGT CTG TCA AGA GAT GCC AAT GCG AGG ATA CGG ATT ATC 4368
A R L S R D A N A R I R I I

4369 GAA ATT GGG GCC GGT ACG GGG GGC ACC ACC GCG ATA GTG CTG 4410
E I G A G T G G T T A I V L

4411 CCA ATG TTA CAA GCC TAT CAG GAT CAT ATC GAT ACG TAT TGT 4452
P M L Q A Y Q D H I D T Y C

4453 TAT ACG GAT GTT TCC AAA GCC TTT TTG ATG CAT GGA CAG GAA 4494
Y T D V S K A F L M H G Q E

4495	CAC	TAC	GGC	GAA	CAA	TAC	CCC	TAT	CTG	AGT	TAT	TGC	CTC	TGT	4536
	H	Y	G	E	Q	Y	P	Y	L	S	Y	C	L	C	
4537	AAT	ATT	GAA	CAG	GAC	TTA	GTG	GCT	CAA	GGA	ATC	AGC	GTT	GGT	4578
	N	I	E	Q	D	L	V	A	Q	G	I	S	V	G	
4579	GAT	TAT	GAT	ATT	GCG	ATC	GCA	GCC	AAT	GTA	TTA	CAT	GCC	ACG	4620
	D	Y	D	I	A	I	A	A	N	V	L	H	A	T	
4621	CGG	AAT	ATA	CAC	GAA	ACG	GTC	AGC	CAT	GTG	AGG	CAG	GCA	TTG	4662
	R	N	I	H	E	T	V	S	H	V	R	Q	A	L	
4663	GCG	GCC	AAC	GGT	TTA	TTG	ATT	TTA	AAT	GAG	TTT	AGC	CAA	AAA	4704
	A	A	N	G	L	L	I	L	N	E	F	S	Q	K	
4705	AGC	GTT	TTT	TCG	AGT	GTG	ATA	TTT	GGT	TTG	ATC	GAT	GGT	TGG	4746
	S	V	F	S	S	V	I	F	G	L	I	D	G	W	
4747	GCC	TTA	TCT	GAA	GAT	ACG	GGA	TTG	CGT	ATT	CCT	GGA	AGC	CCA	4788
	A	L	S	E	D	T	G	L	R	I	P	G	S	P	
4789	GGG	TTA	TAT	CCT	AAG	CAG	TGG	CAA	GCG	GTA	CTG	GAG	GCG	TCG	4830
	G	L	Y	P	K	Q	W	Q	A	V	L	E	A	S	
4831	GGT	TTT	GGT	GAC	GTG	GAA	TTT	CCG	CTC	CAT	GAC	GCT	CGT	GAG	4872
	G	F	G	D	V	E	F	P	L	H	D	A	R	E	

FIG 14B (cont'd)

FIG 14B

4873 TTG GGT CAA CAA ATC ATC CTG GCA ACC AAC GCC CAT GCG AAC 4914
 L G Q Q I I L A T N A H A N

4915 GTT GCT AGC GAT CTT GCG ACA TCG GTG ATT GAT CAT GCC CCC 4956
 V A S D L A A T S V I D H A P

4957 AAG AGA TTG CCA TCC GCC GAG GTC AGC ATG GAT GAG AGA GTG 4998
 K R L P S A E V S M D E R V

4999 AGC CAT GAT GCC ATG ATG AAG GCA TCG GTC AAA CAG TTG TTG 5040
 S H D A M M K A S V K Q L L

5041 GTA GAG CAA TTA TCC CAG TCT TTA AAA CTG GAT ATG AAT GAG 5082
 V E Q L S S Q S L K L D M N E

5083 ATT CAC CCT GAC GAA TCC TTT GCC GAT TAT GGT GTT GAT TCC 5124
 I H P D E S F A D Y G V L S

5125 ATT ACC GGT GCT AGT TTT ATT CAA CAG CTT AAT GAC ACG CTG 5166
 I T G A S F I Q Q L N D T L

5167 ACA CTG ACT TTA AAG ACG GTG TGT TTG TTT GAT CAC AGC TCG 5208
 T L T L K T V C L F D H S S

5209 GTA AAC CGA CTG ACG GCC TAT CTG TTA TCT GAC TAT GGT GAT 5250
 V N R L T A Y L L S D Y G D

FIG 14B (cont'd)

FIG 14B (cont'd)

5251	GAT ATC GCG CAG TGG TTA GCA ACG GCA CCA GCG TTG GTT GAT	5292
	D I A Q W L A T A P A L V D	
5293	CAT CCA CAG AGT GTC AGT CAG GTG TTG CCT GAA AGG TCG	5334
	H P Q S V V S Q V L P E R S	
5335	CCA GCA AGC ACA CAA GCC AAG CCC TTG CCT TCA GTC CCC CCT	5376
	P A S T Q A K P L P S V P P	
5377	TCG TTA TCG ATG GAG TCA CCC GTT CAA CAG GAG TCG ATA GCG	5418
	S L S M E S P V Q Q E S I A	
5419	ATT ATT GGT ATG AGC GGA CGG TTT GCG GCG TCA GAA AAC CTG	5460
	I I G M S G R F A A S E N L	
5461	GAA GCG TTT TGG CAA CAG TTG GCA CAG GGT GTG GAT TTG GTC	5502
	E A F W Q Q L A Q G V D L V	
5503	GAA CCC GCG TCA CGT TGG GGG CCA CAA GCG GAG ACT TAC TAC	5544
	E P A S R W G P Q A E T Y Y	
5545	GGC AGT TTT CTC AAG GAT ATG GAT CAA TTT GAT CCT CTC TTT	5586
	G S F L K D M D Q F D P L F	
5587	TTT AAT CTC TCC GGT GTG GAA GCG AGT TAT ATG GAC CCG CAA	5628
	F N L S G V E A S Y M D P Q	

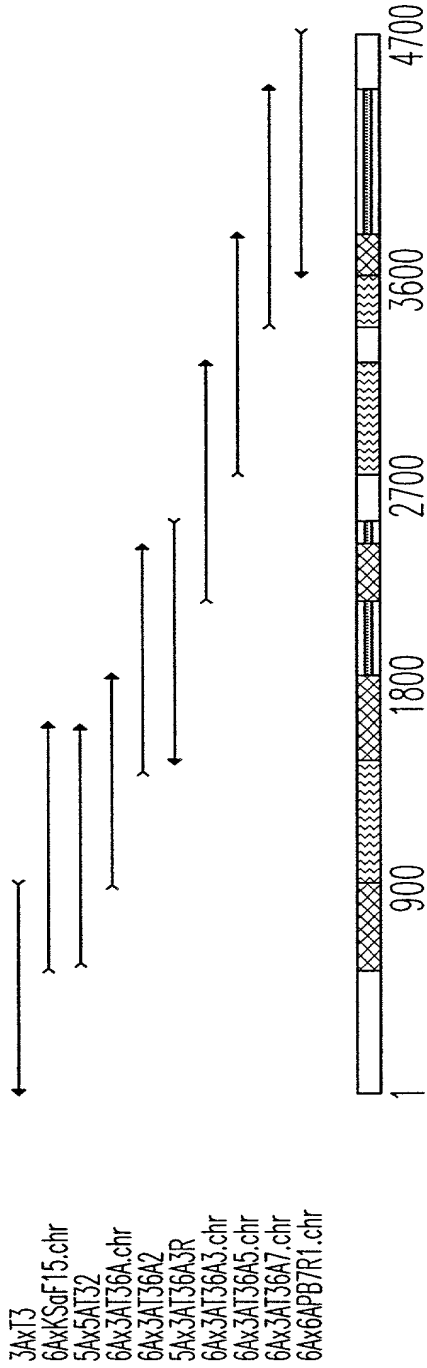
FIG 14B (cont'd)

5629	CAA	CGT	TGT	TTT	CTG	GAG	GAA	TCC	TGG	AAT	GCA	CTG	GAG	AAT	5670
	Q	R	C	F	L	E	E	S	W	N	A	L	E	N	
5671	GCG	GGT	TAT	GTG	GGT	GAT	GGC	ATA	GAA	GGC	AAG	CGT	TGT	GGT	5712
	A	G	Y	V	G	D	G	I	E	G	K	R	C	G	
5713	ATT	TAT	GCC	GGT	TGC	GTG	TCC	GGT	GAC	TAC	GCA	CAA	CTG	TTG	5754
	I	Y	A	G	C	V	S	G	D	Y	A	Q	L	L	
5755	GGC	GAC	CAA	CCC	CCG	CCC	CAG	GCT	TTT	TGG	GGC	AAT	GCC	AGT	5796
	G	D	Q	P	P	P	Q	A	F	W	G	N	A	S	
5797	TCT	ATT	ATT	CCC	GCC	CGG	ATT	GCC	TAT	TAT	TTA	AAT	CTT	CAG	5838
	S	I	I	P	A	R	I	A	Y	Y	L	N	L	Q	
5839	GGC	CCT	GCT	ACC	GCG	GTG	GAT	ACT	GCC	TGC	TCA	AGT	TCT	CTG	5880
	G	P	A	T	A	V	D	T	A	C	S	S	S	L	
5881	GTG	GCG	GTG	CAT	TTG	GCC	TGC	CAG	GCC	CTA	CAC	CTG	GAT	GAA	5922
	V	A	V	H	L	A	C	Q	A	L	H	L	D	E	
5923	ATG	GAG	ATG	GCC	TTG	GCA	GGA	GGT	GTG	TCT	CTT	TAT	CCA	ACC	5964
	M	E	M	A	L	A	G	G	V	S	L	Y	P	T	
5965	CCC	ATC	ATT	GTA	TGA	GTC	TTT	GCG	TGG	TGC	AGA	TAT			6000
	P	I	I	V	Z	V	F	A	W	C	R	Y			

FIG 14B (cont'd)

FIG. 15A

CONTIG 2



CONTIG 5

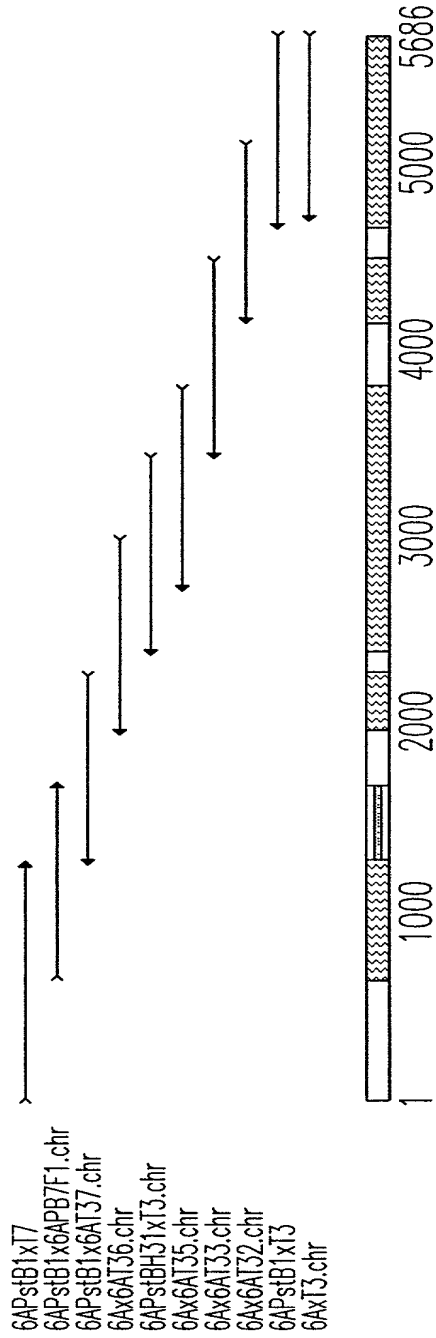


Fig. 15A

*Contig Sequences from Cosmid 6A**Contig 2*

ANCAATTTATNACATCCNCGGGAAAAANACGAACGGTCACCATNTAGGCAG
GCATTGCGGCCAACGGTTATTTTTTTTAAATGAGTTAACCAAAAAAGNGTT
TTTGNAGTGTAATTTGGTTTGNCGANGGTTGGCCTTATTTAANANAGGGA
TTGNGTATTCTTGAAACCCAGGGTTATTTCTAACAGTGCAANCGGTACT
GAGGCGTTCGGNTTTGGTTACGTGAATTTCCGCTCCATGACGCTCGTGAGT
TGGGTCAACAAATCATCCTGGCAACCAACGCCCATGCGAACGTTGTAGCG
ATCTTGCGACATCGGTGATTGATCATGCCCCCAAGAGATTGCCATCCGCC
GAGGTCAGCATGGATAAAGAGTAGCCATGATGCCATGATGAAGGCATCGG
TCAAACAGTTGTTGGTAGAGCAATTATCCCAGTCTTTAAACTGGATATG
AATGAGATTCACCCTGACGAATCCTTTGCCGATTATGGTGTTGATTCCAT
TACCGGTGCTAGTTTTATTCAACAGCTTAATGACACGCTGACACTGAYTT
KRAAGACKKTGTGTTTGCTTGATCACAGCTCGGTAAACCGACTGACGGCC
TATCTGTTATCTGACTATGGTGATGATATCGCGCAGTGGTTAGCAACGGC
ACCAGCGTTGGTTGATCATCCACAGAGTGTCGTGAGTCAGGTGTTGCCTG
AAAGGTCGCCAGCAAGCACACAAGCCAAGCCCTTGCCCTTCAGTCCCCCT
TCGTTATCGATGGAGTCACCCGTTCAACAGGAGTCGATAGCGATTATTGG
TATGAGCGGACGGTTTGCGGCGTCAGAAAACCTGGAAGCGTTTTGGCAAC
AGTTGGCACAGGGTGTGGATTTGGTGAACCCGCGTCACGTTGGGGGCCA
CAAGCGGAGACTTACTACGGCAGKTTYCTCAAGGATATGGATCAATTTGA
TCCTCTCTTTTTTAATCTCTCCGGTGTGGAAGCGAGTTATATGGACCCGC
AACACGTTGTTTTCTGGAGGAATCCTGGAATGCACTGGAGAATGCGGGT
TATGTGGGTGATGGCATAGAAGGCAAGCGTTGTGGTATTTATGCCGGTTG
CGTGTCCGGTGACTACGCACAACCTGTTGGGCGACCAACCCCCGCCCCAGG
CTTTTTGGGGCAATGCCAGTTCTATTATTCGCCCGCGGATTGCCTATTAT
TTAAATCTTCAGGGCCCTGCTACCGCGGTGGATACTGCCTGCTCAAGTTC
TCTGGTGGCGGTGCATTTGGCCTGCCAGGCCCTACACCTGGATGAAATGG
AGATGGCCTTGGCAGGAGGTGTGTCTCTTTATCCAACCCC : ATCATTGTA
TGAGTCTTTGCGTGGTGCAGATATGCTCTCTTCGAGGGGGCGTTGCCACA
: GCTTTGATGCCTGTGCCSACGGTATCGTCATTKGTGAATGGGTGGGGGK
GGTG : GG : GCTAAAACGCTTGTGCGCGGCATTTGGCCGGATGGC : AATCA
TATTCACGGAGTGATTGCTGGCAGTGGTATCAA : TCAAAACGGTCGTAGT
AAMTGGGAATACGGGCACCCAGTGCMCAAATSCAAAGAACGCTTGWAAC
GTTGGGTT : TATGATCGCTTTGDTGYAAACCTTKAGCAHATKAGCATGKT
CGAAGGCCVDTGGACAGGGCACGRDYYTAGGTGKACCCARTTGAAAYRT
DAAACYTTAMACCCGGVGGTTTAGACACTWADACGSAATAAAGAAHAATD
HTGVGCHATCGSGTCGGC : CAAAACCAATATGGGAMACYGGSACCATGGT
WGGCTGGGTDGTTTTGGGGGGCTTGTKKGATTRTKKAAAG : TGGTGTTGTCGAT
GCAACACCGGCAAAATACCTCCATCGCTACATTTTACTCAGGGCAATCCG

FIG. 15B

AATATTGACTTTTGATCGCAGTCCTTTTTTATGTGAACACCGAGCTTCGTGA
 TTGGTTCGGTGGGTGAAGGAGAGACCCGTTGTGCGACGGTGAGCGCCTTTG
 GATTTAGTGGTACCAATGCCCATGCAGTGATAGAAGAAGCGCCGCCAGTC
 GTGCGCCAACATGAAGAGCAGCCGGGTATTTAAGTGGTCTTATCGGCGC
 ATAGTGATGATCAATTACGGCAGCAAGGTTGAGAACTTTATGCGGGTTAT
 TGTGAGCATCACCTTGAGTTGGATGTGGGCAARTCYTGAGRTTATACCTT
 ATTG:TTGGG:TCGTCAACATTGG:TCGCATCGTCTGGCTGGTG:TTGGGTCAG
 T:GTGATCTTGAGGATTTGCGGCGGTCACTGGATCAGTGG:TTGGGTCAG
 GGTAAGGCTCCCCGAGTGTATGT:GTCT:GCA:TTGGCTGAGGGTGAACC
 AC:GTCTA:CAAGTTTCTCTACAGCACGTTGGTAATGAATGTATAAGAGC
 A:TGCAGTGAGTCCTGTTCTGCGAATCACTATGTGGACGCGTTATCGACG
 GTGGGGGAWTTATATGTTTCAAGGTTATCCATTGGAGTATGGTGTGTTGTT
 TGSCCAKGGCWATRRWCKTWTTSSKTTKCCGAMCTAKSSGTTTSCWARKC
 AGCGTTGTTGGGTACCACAAACAATAAGCCACTCCACAGTGGATGCTATA
 TCACAGCATGCTTTTTTACATCCTTTGTTACATCGAAATACTTCGGACTT
 TTCATGTCAGCGTTTTAGCTCCACATTTAATGGGAGTGAATTTTTTCTTA
 CTGACCACCTTATTCTAGGCAAAAAGATATTGCCCGGAGCCGMTYMTTTC
 GAAATGGTCCGAGAGGCCATCAAACAAGCTTGTGGATTTTTTGGATAATTC
 TGAAGTTGTTATTTCAGCTCAATGATATTGTATGGACAAAAGTGATTGCAG
 TTGATGATGATATCAAAGAAGTACATATTGATCTTTTTTTGTAGAAAATGG
 CAGTGAATCATGCTTAACGCATGAGTTTGATAGGCAAAACATATCGCTTA
 ACTATGAAGTTTATACGCAAAATAGTGAGGGAAATGGCAGGCAGAATAAA
 AAAATTATTCATAATCACSGCATGGTCACCTTGAGTTTCTTTGAATACAA
 CCGGAGGTTGTAGATCTTGATGAACTACSCMGCCMCTATAAATCAASCAA
 GTCTTANATGCTGAACAAATGTTATTTGGCGTTTGGAATCAATARGTGTT
 CAKWWTGGTGACAGGCMCCGATGTATARATACSGTWTATWTCGGTGAGCA
 TCAAGTATTARCMAAACTYTYTWGCCAGAAATTGCAGGAGAWTTGGATA
 ARTSCTTTGTTTTGCACCCAGGCATGGTAGATTCTGCTTTACAGGCCACA
 TTGGGTATTACTTCTGATATCAATGATATCATGTTAGCCGATCGCCAAGC
 CGATTATATCTTGACCCCCAAGTCGACGCTTCCCTTTGCTCTKGWMAAAS
 TKKAAWTWAYYSGAAAAYGTWCAGATTCTATGTGGGTTTGGATTCKAAAT
 TCTTTATCGACAGACCASAAGTCTCCACGCTCAGCCCGTTAATGATATAC
 AACATCTCGACATTGATCTAFTGGACGCTCAAGGAAAAGTATGTGTGCGA
 ATGCGAGGTTTCTTGCTCTCGGGTTTTGCCCAAACAATGGTTAATTCACTA
 SCAGAAGAACCGTTTACAGCTTTGAATAACCAGCAAGCACC:TTACTTTT
 TCCAATCCCAGGTATGGCGTT:CGCCAGACTCTTATCCAAGTGGCCAATT
 AACCTACCTTAAWTGATGCCCCGGTCCATCCTTGGGGTGGTTGTACGNAT
 TTGAAATATGGACTTAATGTAGAAAATAGAAGGATGTAGAGGTTTATTGA
 CCTTACACTCCCAAACCACTTGGATTTACAGGATCGCTACTTGTGATATT
 TGCATGCGAGGTATTTGAAATTGTAAAANGACGTAATGATAGATAAATCC
 GTACAACCAGTACTGATTCAGTTGTTAGTTTCTAATGATGGAGAACAAAGG
 GGTATTCACCAGTTTATTGGCATTACTAAAGGTGGCTCGCTCAGAAAACC

FIG 15B (cont'd)

CCAAAGTGATTACACAATTAATTCAAGTACAATAGTCCCGCAAACCTCGC
 AAAATTTACTACGGATTATCACTGAAAATAGTCATGATATAACACATGCA
 GAAATTCGTTATCACTTGGNATCAACGTGAATGTTTGKTTTGGKAASCAG
 TACCCAAATCTACAAAAACYTTACTCAACTCCCTGGAAATCTAACAGWGT
 TTATYTCWTTMCGGGAGGKACCGGTGGAATTAGCGTCACAGTTTGTCAA
 GCGWTAGCAGTGAGTCCCACAAAATCGGTATTAATCTTKGTAGGKCSKTC
 ACCACTCMATGRTGAAAAGAAATCTTAWTTAACTAGAACTGGRATCCGTT
 GGGGGACCATTTATTAAWTMCTATCARAACRGATGTAAGCCAACANGGATC
 AAGTTAAAGCWTTGWTTAAARAAATTKTTCASCAWTMCGGTCAATTGAAW
 GGKGTSTTSYATTGTGCAGGTATTGTCAACGACAATTTTATTCTCAAAAA
 GTCCTCGACAGAATACAAAGAGGTATTGTTGTNTAAAGTATCNGGTNCTG
 TCAATTTAGACCAGGCANCACANAGNATAGAGATGGATTTTCTTATNNTA
 NTAAAAACGTTATCTGCAGTATTCGGANNNACAGNACAGGGTNTTAGATA
 ATNGTCCAAATACTTTTTCCAGGTGTTGGGTAAANGGGATTGGAANCCAA

Contig 5

GCNCTTNCCGCGGTGGCGGCCGCTCTAGAACTAGTGGATCCCCCGGGCTG
 CAGTATTCGGAAATGCAGGTCAATCAGATTATTCAACGGCAAATAAATTT
 ATGGATGAGTTTGCACGCTATCGTAATGCTCTGGTCAATCGCAAAGAGCG
 CTATGGTTTAACTATCGATTAATTGGCCGTACTGGAGAGAAGGAGGTA
 TGAGTATTGAGGAAAATTTTGAAAATATAATGCAAGAGAATACCGGTATG
 TCCGCCCTGGAGACATCACAAGGTATTGAAGTATTACAAAGAGCTTGGA
 GTTGCAGTACACGCAATTGTTGGTAATGGTCGGAGAGATGAAGCGAATGG
 AGAGCTTTTTGCACAAGCAGGGTTTCGAGCAGATTCCCTGTGGTATCCGCC
 GATACTGTCAGCGAGAATAAAACCTCGACTATTGAGAATCTTTCAGCCGA
 TGTAGATACATTACCATTTCATTGAGGTTTCAGGCATACAATATGGAACAAA
 AAACCCCTTGATTACTTAAAAAATGTATTTGCCACCACAACACAAATCCCC
 GAGAAAAATATTTATGTTTCATGAAACATTGGATAAATACGGAGTTGATTC
 ATTGTTGGTGATGAAAATGACCAATCAATTGGAAAAAGTATTTGGAAAAT
 TATCTAAAACCTATTTTTTTGAATATCAAACCATTTCGCGAACTGGGCGAT
 TATTTCCCTGAAATTTTCATGATGAAAAGTTAAGGGAGTTTTTTTCAGATAGA
 TAGCAAACCTATCTATGTTAAATAATCACGGAGAGATTGAAGTTCAAAAAA
 AAGGGGATGAACCATCGGTTGGAGACAGATATAAGTCAGCTGGATGCCGT
 GCCTATCTCGGTTTATATCGCCTGTGTCAGCAGTGAATCATCAACCAAAA
 AAATGTTAACAATGGTTCCMATANTCATCAGCCAGTAATGGGATATTGGC
 GAWTATTGGGTCTGAGKGGGTCGTTATTCCMCAAGCCTGAGAAATATNGG
 AGGGAATACTGGGAAGAAATTTGTGTCAANGGCAAGGGACTGGTATTAN
 CNGGAAANTTCAAANGGAGCCGTTGGGGATTGGSAAAGACTATTWYACMS
 MTNNNGATCCSTATTCAGCCMGGTGGGACATCGCAGTAAATNGGGGKGGT
 TTTATTCGGGATGTTGATAAGTTCGATCCGTTATTTTTTAATATTTCCCC
 TAGKGRGGKGGAGCTYRCTSATCCTCAGGAAYKWTTATTTYCTAGRGTC

FIG 15B (cont'd)

GCGTKGGCTGCATTGGAAGACCCTGGAWATTGCCGGGNATTATTTGCAAA
 TGTTGTCATCAAGGACTAAATCTTCATTCTCGTCGGRAGATGTTGGTGT
 TATGTGGRAGTRATGTCTTCAGAAATATCAGTTGTTTGCTTTTGAACAGAA
 WTTACGTGGTCACCCCATATCCTCNGGTTGGGAGTTATGCCAGTATTGCT
 AMCCSGGTGTCTTATGTTTTARATCTACACNGGCCCAASCATGACAGTGG
 ATMCGATGTGKCTARTTCGTTAACGACGCTWCACCTAGCATGKCAGGGA
 TTTAAACTGGGKCGAAACTGACCYGGGTATTGKCGGKGGAGTTAAWATT
 ACCATTACCCCMATAAATATYAGGCSCTGAGTCACGCYCAAATTATTTY
 TACTAGTGGTSGTTGCCAAARTTTTGGTGAACAGGGACAGGGTTATATCC
 CTGGTGAAGGAGTGGGTGCCATAATACTGAAGCGCTTGGTCGATGCCGAG
 CGTGACGGTGATCATATTTATGGTGTGTGTTAAAGGCAGTGCCGTAAACCA
 TGGTGGTAAAACCAACGGCTATAACGTTCTTAATCCGAATGCACAACAGC
 AAGTGGTGAGTCGTGCACTACGAGAAGCCGCAGTAAACCCCATCATGTG
 ACTTATATTGAGGCACATGGAACAGGAACCCAATTGGGTGACCCGATAGA
 AATTACTGKTCTRAMMAAAGCGTTCAATAGTTTGACCAATGAGCTTGGTT
 TAAGCGCTGTGSCCAAACMATYGKGTGTGATCGGSTCARKGAAGTCAAAA
 TATAGGGCATTGTGAGYCASCAAGCCGGTGTGTCAGCTATTAGCAAAGTA
 TTGTTACAAATGCAACACGGGTCAAATAGTCCCTTCTTTACATTCAAAAG
 CATTGAATCCCAATATTGATTTTACTGTGACTCCCTTTGTAGTAAACCAA
 GGGTTATTGGA CTGGAACGACTTGAAGTTGAAGGAAAGAGGGTRCCGAG
 AATKGCTKKYMWWWCKKYTTTTGGGGCCGGTGGCTCAAATGCCCATGTAG
 TGATTGAGGAGTACGTTGCCAGCAATGAAAAGCAAGAGGATTTTCAAGGA
 AAAGTAATTATCCCTTTATCGGCWATAGACTTSKGATCARCTACAARAAA
 WARKGGATCGTTTGCTTAAGTTTATCRAAAAAAATGAAGCAAARAGGTAG
 GGAAWTKSGCTTAATTGWYTTGCCGWAWACATTGCAACTTGGGCGCGAG
 GTCAATGARAGGAACGTCTGGNCMTTNGANTTGTAGGAATCNAATACCAA
 ATGCTTAANGGAAAGATTTTAGCAAAGGNTTTAAATACTCAGAAAATNGA
 TGCACANATTTTTTCGATACTTATCAAAAAGRCATTTTATCGGGGTTTCGTA
 CTAGACCTGGGTGCGTTGRATTTTCGCTATTTTTTTCTGAAGATGAAGAATA
 TGGCCAACACGCTTGATATTTTGGATTCAAAAAGGTAAATACTTTAAG : C
 TGGCGGAGCTTTGGGTAAAAGGTGTGACTATTGATTGGAATAAATGGTAT
 AACGCATTATTAACCCAGAATAAATATTTGAAACC : TCGTCGTATTAGTT
 TGCC : AAC : GTATCCTTTTTCCAGGGATCGTTATTGGATT : CC : AAGTGC
 TTTTCCACAA : CAAACATTTTCTACAGTAATTGAGGCAGACGCCAACCMA
 AACATTGAATGAGCTACTGTGTTTTGAAGAAAAATGGCAGGTGCAATCGG
 AACTACATGACTCTGTTGCAGATCAATCTAATGTTATCAATACATTAATT
 TGTTTTTTAACTGAGAAAGAGCATCAAAAAGCATTACAACAATCAATATC
 ATTCCATAGCCCGAAAACACGATTGATTTTATCAGCCAGGCTCAGGCTT
 ATGAGCAGTATTCATCAGATCACTATGCGGTTAATCCAGAAATAGGAAAG
 ACGTACCAACAGGCTTTTCAACACATTGTGAAAAGTATTCATAAAAAGTGA
 TGTCACGGACATAATGTATTTATGGGCTCTAGAGGATGAACGCTGGATTA
 CGTCTCCTCTACCTATTGTATATCTTTTAAAAAGTATTGAGGTTTCTTTA

FIG 15B (cont'd)

TTAAACCARAAAAATTACTATTTGTTGGAGAATTTAAGACAAGCTTAKC
 RRCGAYTGTYACYKRAAKCCWRGKKGGGWTTYGMAMRWYCKKWAKSGTT
 DGTGCAACSGRATWTKRAGGTTGCGGTGTTATTARAGGCMRTGGAAGGTA
 CTYAATCCCATMCAGTGACAAAGCAAATGGATCCTTTGGATAGAAAAATTG
 TGGTCGTCCTTAAAAGCCCCAAAAAGTTCATAGTAGCTTATACCAAATG
 TCGTAGATATTTTTCTGAAAACCCCAMCCGCTGCAANCTTGTCATGAACC
 AAAGTATTCAAATGCTTACAGGGRACCTTTATTGATAACAGSTGSYTGTGR
 AGGACTGGGTTTTGTCTTYGCAGATTATTTTTCCAAGACATATAAAATTA
 ATCTGATATTGGTTGGGCGCTCTGATCTTGATAAAGAGAAAGSWWTCGSR
 RATWCRGRMTYK GKWWMAATCAGGTAGTCGAGTGGCTTATGTTTCAGACGG
 ATATCTGCGATGAAAAGAATCTCCAATTGGAATTGGATATTGCCCAAAAA
 TATTGTGGCCCTATTACAGGGTGTCAATTCATGCCGCGGGCATCATTGATCA
 GAAGACAATTTTTGAAAAAAGTCCTGAAAACCTTCAAGCAGTATTAGCCC
 NTAAAATTCAGGGTACATTGATTCTGGATAACGTATTGTCAGCGCAATCA
 CTGGATTTTATATGTTACTTTTCTTCAAGCTCGGCTCTATTAGGTGATGC
 AGGATCATGTGATTATGCAATGGCTAATCGATTTTTTGATGGCCCATGCAC
 AGTATAGAAATACCTYGGTATCTGAARGAAAAMSCAAGGGRAAGACMCTG
 KTTWTTCAATTGGCCCGCCTGGAATGTGAAAGGAATGGGATTGAATGGACT
 GGAATGAGAACGTGAAAMCARAGTTCTWYTTAAGTCCAAGCGGGCAASG
 TCTATTGGACATAAAGGAAGGTTGTGAGGTTATTGAACACATTRCTGGCT
 CAGGATTATTYTCAGTGTCTAWATTGGSTGGKAGGAAAAACNGTATCW
 AACAATTTTTTGGGTCTCACACAAAGATGTTTCTNACCTCACAAAGTGAGT
 CAAGGGCAGGMAGTRAWGAACWWASRRSWKKMYKKRRASSKSYAMYAAAC
 GAGCTGAGATAGAAGACTTTAAGTGTGGAAGAATGTATTATTTTGGACTT
 AAAAATCTGATTACAGAGCAACTTAAAATACCCATCAGCTCATCTGGAT
 GTAGAGAGTAATTTAGCAGATTTTGGTTTTGATTTCGGTCAGTTTAGCAA
 CTTTTCCCGTGSTTTAAGTATTCMCTATCATTYCAAWAWTACGCCRTSTK
 TATTTTTTCGGATATCCTACCATAGAGCGTYTAARCCGTTATTTTTTAAAA
 GAACMCMCTGCGSTTATGGAGGCGTTTTATCAGCAGAAAAAACATYTWA
 TAGTAACAATACVCTGTCCG : TATAGTCCYT CATGTCAAAGAAAAGCCGW
 CAACTGATCTAATATCATCCARC : GCCTCT : CCTTTTATTGCAGATCCAT
 TGCCCCCTCAGGSTATTTGAGAGTATTGATGAGCCTATTGCCATTATTGGT
 ATGAGTGGTCGTTTTCCAGAAGCGCGTACGG : TTAAAGCAATGTGGGAGA
 TTTTATCCGAAGGTAAAAGTSYTGTCAGGAGATTCTTATAGAGCGCTTT
 A : ATTGGCATGAATATTATGAACACCCATCGGATGATGTTYGAA : AA : DB
 TAATAGTAAATGGAGYGCCTGCATTCCTGGTATTAAAGAATTCGATCCAC
 AATTTTTTCGAAATTTCTCCAAGAGAGGCAAAAAARCTGGACCCTCTTCAA
 CGGCWCTTATCACAGGAATCMTSGAATGCATTGGWAAATSCTGCTTATGK
 WWWMYWACRCWKWGMTMWTWARACRATGGGATAYKTKKATTGGTRTTGAW
 SMAGGKTWTTATMMRRRYMWGMTCAATKMRGWYGACSGCACACWTTWAWC
 CATMAKRMTATTTTRGCATACCMGYTGSCAGTWYTYWTTARAKYTTAAT
 GGSCMWRSSATGGCWRTWAAWRCCGWTGYTCCTCCGSYWTGGYYGCRMT

FIG 15B (cont'd)

TCACCAMGCTKSCSYSAGTTTACKWCARCAAGCAATKYGAWRCGSCKAWK
GWCSCGGCAGCWWWYTTRMWMWYACRSSKSAWSWTKAWSTGGSCWTGAY
SSAWGSGRGYMTGAKMYSACMWGAWSYATAMYGAWAKACCKARNRTCAM
CSYGCCAAKSGCRYAGTGMYTGGAKAGSMWGYTGWTGCARTCGTAYTGMA
ACRWMTCCTTKSGGGKTTTCCAAAAGGGGTTMMAAAT

FIG. 15B (cont'd)

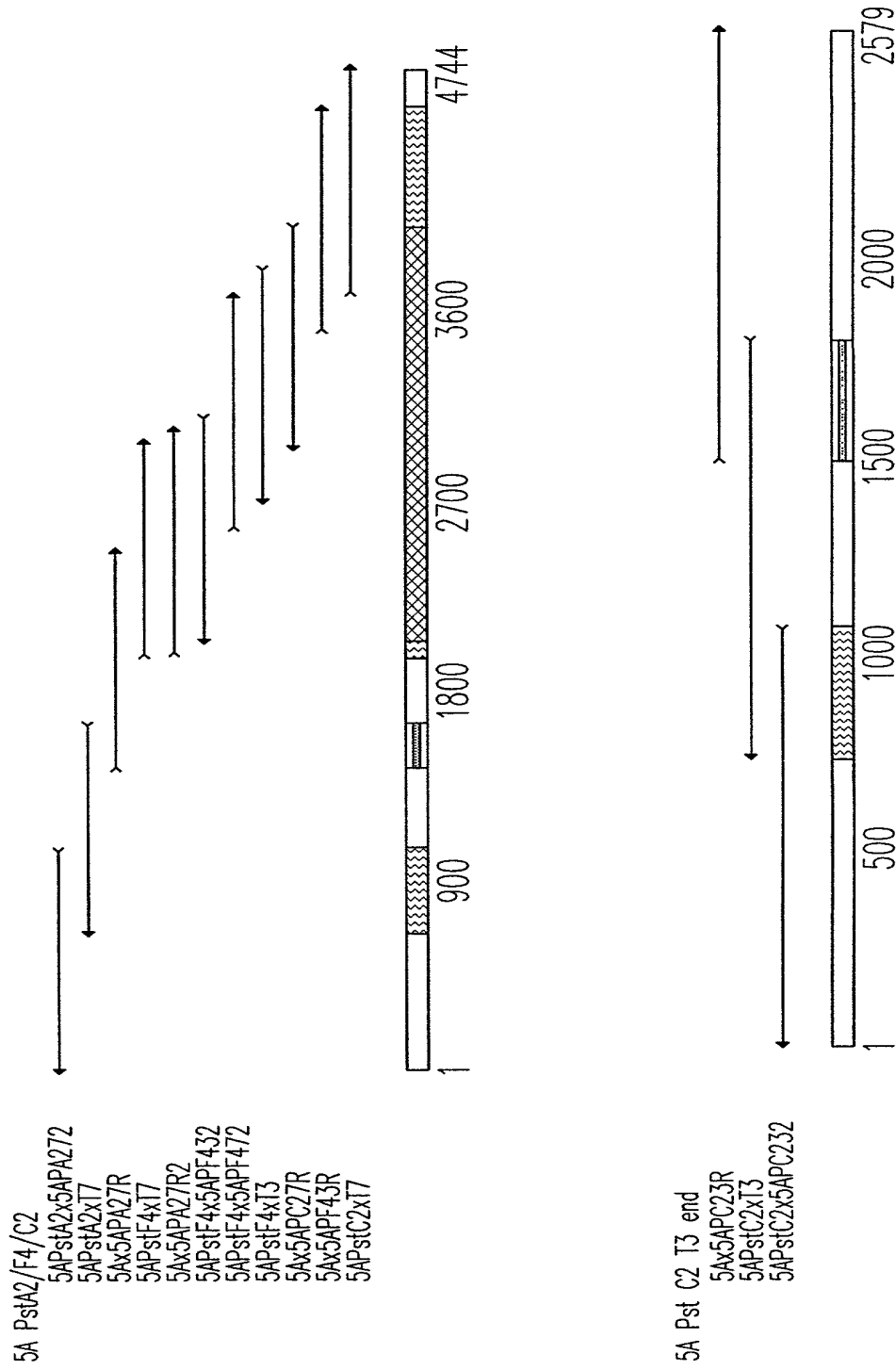


Fig. 16A

5A Pst A2/F4/C2 Overlap Sequence

GNGATGAGATTGATGAGAATACTTAATTTGGTCGAANAGGCCATTACNTC
 TATGATTCTTGGTGAATTTATAAGCCAATTAACCNGTGATTTAGTTTGGGA
 ATATGAAAGAACCCGTTTTATTTGACTATCNGAATATTAATACTTTATCG
 AATATGATCGAGAATGAACTCGAAGCTGTTGAGGTATAGTTATGTTAGAA
 GTTATTAATAGATACTGCCATGGATACGTATTCGTGCCAGTGGTATTGGC
 CNTAGAAGAAAAAGGGTTTTTTTGACCTTTTTTACAAGGAATAGATACCTTA
 CATTTGAAAAAATAAAAAACAGAATTAAATGCTAATAGTGGCCATCTTCAA
 GTAGCCTTACGCATGTTGCAGTCTGTTTCATGGATATCATGTGATGATAA
 AGGGTATGTACTAACAGATGCAGCGGACGAAAGAAATAAAATATCTAGTG
 ATTTTATAGAGCTTTTTAATTTCTCTATGAGTCGCTATTTAGAAAATATG
 GAAAGGCATGGATTAAAAAATGGATAGATCAATCCGGAGATAACTGGGG
 TATTTCAAACCCGTGTATTAACCGATTTTTTTGGATGGTGTTTTAATTATTC
 CCTTATTACTAGAACTGAAGGAAAATGGTTATTTTGATGCGTTAAAAAAT
 GKWAATAGTCTAAATAAAAAATTATTTTTAGGNTGATATCGAACAATCGG
 NTTCGCAAWGAAATTATTACACTATTTTAAACAAAAGAACTGGCTCCAAG
 AAGAATRAAGAGACGTTTTACTTCACAAAANTCTGGTCAATTTNAYCACT
 CAACGAATTTTTATTACCGCAATCCATTGCTTCTTATAAGCCCATGTTTA
 TCTCGGGATAACGGAATTAATGTTTGGTAATGCTAGGAGTATTTTTTAAAA
 AGGGATTGCATGGAGAGGAGAGCCATGTTGACCGAACCTTAAATGTTATT
 GGTAGTGGTTTTTCAACATCAAAAGTACTTCGCTGATATCGAAGCGTTAGT
 CATTCAAGTTATTTAATGATAMTTTKTACGATSRAYWSCCGAAATRKRTTS
 CRRATATGGGTTGTGGTGATGGGACTCTACTAAAAAATATTTACAATATT
 ATCAAGGAAAAATCTGCACGAGGAAACGTGTTGAATCACTATCCCGTGGT
 ACTTATTGGTATTGATTATAATGAAGCCGCTTTGCAGGAAACTAACATA
 CACTGGCAGGTGTTGATACAAGACACTATGTTTTTAAAAGGCGATATTGGT
 GATCCTGAAGGAATGATAAGTGATCTATATGATTTAGGTATTAAGATCC
 TGAGAATATATTGCATGTGCGTTCATTTCTGGATCATGATCGTCCTTATA
 TTGCACCCACAGAGGTGATGAATATTGAAGCACGTTCAAAGATATTTGAT
 CAGGGCGTGATGTTGATTGAGAAGGTCAAGCAATATCGCCTGTGGTTAT
 GATACAAAGTCTGGTGGAACATTTTTAAACGCTGGTCTTGTGTAAAGACGA
 AACATGGCTTGCTTATATTAGAAGTACATTCTCTTAACCCTGAGGTTGTC
 AACCAATATTTGGATGAAAGTGAAAGTTTGCATTTTGATGCCTATCATGG
 TTTTTCTCTCAATATTTAGTATCGGCTGAGGATTTTCTAATATGTGCTG
 CAGAAGCTGGTTTTATTTTCTAAACCTGATGTTTCTCAAAATTATCCAAGG
 AACTTACCTTTTACTCGAATTACCCTAAATTTTTTTGAAAAAAGCCTTA
 TCAAATTCGTCAACCCGAATGAAAATGATTTGTCTGCATTGATGGATTTAG
 AAAAAATTTGTGACCTAATAATCAATGTTTATGCATTGATGACCTTCGC
 CAACGCATAGATGAATACCCAAAAGGTCAATGTGTTTTAGAAATTAACAA
 TACCATTGTTGCAGTGATTTATTCACAAAAGTGATTAATAGAGTGTTAG
 GCACTGCTGCAGGTGTTTGGCARSWSWWTGSCMDHGAATRTGBDWDCAC

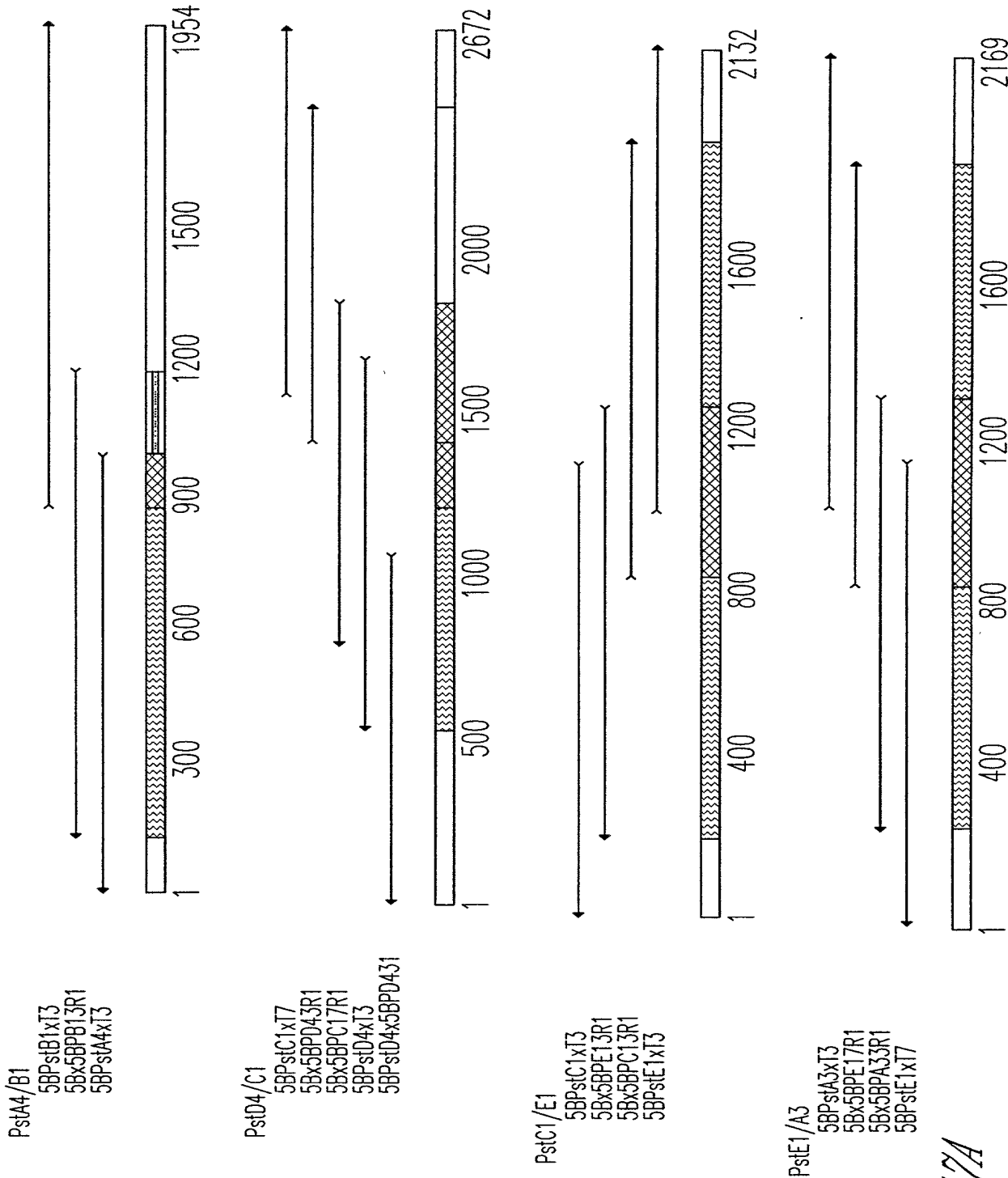
FIG. 16B

FIG. 16B (cont'd)

CGGAGTTWATGGACCCTCASCAAAGAAAACCTACCTGGAATTAARTTGGCA
GGTCATASAGCATGCCGGATATAAACCCATCGGYTTTTTCTGGTCAAAGA
NATYGGYATCTATGTGGGGTGCTTTGTCCACCGGTAATTTATATGGGAGTT
ATTTAACTAAAAGTGACCAAANGCCCTAAAAACCAACCGGNAAGGCCTAT
TTKCATGACCARGTARTANATTGTTGTTTCGTYTTTMCCCCAATAANAATT
TTCCTATTTTNTATTAATTTTTTAAARGTGCCCMSCSTCCTCTWTCTGAT
WCCGNGCTTGTTCAARYAGTTTTAGGTTGCCTWTTTGACCCAANCARTTT
TATGCGNATTCAATTCGGGGNANGGNGTGAATCAGGCNTCTGGTGGGNTG
GGGAYCAATTWAATRTCCCTCCSMRTGAWACCGGTTTCTTNATTAYYWA
GCAGGTNTGTTNTCAAAATCNGGGAATGTAAACCTTTNGATCCACCGCCC
GTTGGTTTTNTNCCTGGGNAAAGGGGGCGCTNTTCTTTTTTTTNAATCNTT
TTCTCANCCCNATTTTAAAANGATTGTTTTTTTNGGGGTTTTAAAGGGGGG
AGATNAAAATNGGGGGCAANCATTNNTTACGGCCCTAACCTNNG

FIG. 16B (cont'd)

TOP SECRET



5B PstA4/B1

FIG 17B

GGNGGCCCCCGGTGGGTTCNTTNNTGGGGGNAAAAATTTAAAAATTTAA
TTTN

5B PstD4/C1

ANCCGAAAAANACCNAAGGGNNGCCGGCCCNCTGTCCTNCGAGTGCAATNA
TAAAAAANCCAGTNATAAGNNGGNNACAATANTCATGCCCCGCGCCCNCC
GNAAGNAACCTNANTGGGTNAAGGCTTCAAGGGCATCGGTCAAGGAACC
TTTCGGCGGGCTTTTGCTGTGCGACAGGCTCACGTNTAAAAAGGAAATAA
ATCATGGGTCTATAAAATTATCACGTTGTCCGGGCGCGGCGACGAATGTTC
TGTATGCGCTGTTTTTCCGTGGCGCGTTGCTGTCTGGTGATCTGCCTTCT
AAATCTGGCACAGCCGAATTGCGCGAGCTTGGTTTTGCTGAAACCAGACA
CACAGCAACTGAATACCAGAAAGAAAATCACTTTACCTTTCTGACATCAG
AAGGGCAGAAATTTGCCGTTGAACACCTGGTCAATACGCGTTTTGGTGAG
CAGCAATATTGCGCTTCGATGACGCTTGGCGTTGAGATTGATACCTCTGC
TGCACAAAAGGCAATCGACGAGCTGSRCYMSCRMAKTYGKGMCMCCGKMW
CCTWMRARSTTWTTCSCAAWRRAGKKTWTTMAWMAAGSMCSYGSKRKY
GSWWTGGWRCATWCCACGMARCSSMWWTYGAAAMACCKSRKCYGGNTKW
CSRAWAWMWACMRSMYCASCTTGGWAWMMARMRWSMTGASYWGWCKCWG
AAMAAGTWACCSTCRGKGCCGMTWWGKKCAAWKTTWMACCYSRWRWRR
YMCMAAMATTGARRCSTTGMVCGRAACCSCGMTGAAAAA : : CGCTGH : TG
: : AATGTRVGGCGT : TGGATGTCHCAAAGCAAATGGCASCAGACAA : GAA
AGCGATGGATGAACT : : GGCTTCCTTATGTCCGCCCCGCCAKTCATGAT
GGAATGTTTCCCCSSGGTGGTGTATCTGGCACCAGTGCCGTCGATAG : T
A : TGC : AA : TT : GA : TAA : TT : ATT : ATCATTT : G : CGGG : TCCTTT : CC
GG : CGATCC : GCCTTGTTTACGGGGCGGCGACCTCG : CGGGTTTTTCGCTA
TTTATGAAAATTTTCCGGTTTAAGGCGTTTCCGTTCTTCTTCGTCATAAC
TTAATGTTTTTTATTTAAAAATACCCTCTGAAAAGAAAGGAAACGACAGGTG
CTGAAAGCGAGCTTTTTTGGCCTCTGTCTGTTTCTTTCTCTGTTTTTGTCC
CGTGGAATGAACAATGGAAGTCAACAAAAAGCAGAGCTTATCGATGATAA
GCGGTCAAACATGAGAATTGCGGGCCGCATAATACGACTCACTATAGGGA
TCATATTTATGGTGTTATTAAAGGGAGTGCCATCAATCATGGTGGAACAA
CCAATGGCTATAGTGTGCCTAATCCGGATAAGCAACAGCGTGTCATTAGT
GAGGCTTTGCAGCGGGCTCAAATAGCTCCTCATCAAGTCAGTTATGTAGA
AGCGCATGGTGCGGGAAGCCGTTTAGGCGACCCAATAGAAATTACGGCTC
TCAGCAAAGCATTTAACAATGTTAGTGCGCAATTTAATGTGAAAAGTGCA
GCCAATCAATCGTGTTTTTATTGGCTCGGTAAAATCCAATATAGGAACTG
TGAATCTGCAGCAGGGAC : TGCCAGTATTAGCAAAGTATTGCTACAAATG
AAACATGGGCAAATAGTGCCGTCCTTGCAATCAAAGAACTGAATCCCAA
TATTGATTTTTTCACTCACTCCCTTTGTGGTTAACCAAGAACTGCGCGATT
GGCAGAGACCGCTGATTGATGGAACAAACAGTGCCGAGAGTTGCGGGTGTC
TTTTCATTTGGGGCAGGTGGTTCCAAT : GC : TTACGTGGTGATTGAAGAG

FIG. 17B (cont'd)

TATATTGCGAAGATACCGACAAATAACACCAGGGAATCTATAAACCATAG
 GTCTATTATTCCATTATCAGCACGAAGTCTGAGCAGTTGCGGCAAATTG
 CCAGTAGATTGCTGGCATTATTATTGAAAAGAACAAGCAAGACAGCGTGGTT
 ACCCCCTTAATAGATATTGCTTATACATTGCAGGTAGGACGCGAAGCAAT
 GGATGAACGCTTGGGGTTTATTGTGAGTTCAACCCGATGAATTAGTCGAA
 GAACTACGAAGATATCTTCAAACACACGATGATATGGAAGAGCTTTATCG
 AGGTCAGGTTAATCGATATGAAGACACCTTTCTTACTATGGCGGCTGGAT
 GGAAGATCTCTCTTGAGGCTATCCCACCCATTGTTGGGATTAAAAACGAAA
 AACTGGTCTTAAGTTTAATGCCAATTATTTGGGATTAAAAAGGGGTCTTT
 GTGGATTTAAWTTKGGGRKRAGWTATASSWTKKYTTMCCAAARGRKGTW
 KTCCYCSGCRMATKARMKKAYTACCTRCCYTTYGGCRGSMATATTTTTTA
 RGWTKKTAMMSWTYRNMCCCTCWTWCCTYTTTKTGRCCCCAGGGNCCAAA
 TTTATTTTNGTTTGNNGGGAATTTNGTTTAAAAAGAATTCGGTTAANC
 CCACCTNCCNTTAACTTTTCAATTTTGGGGGGNAATGGGTTTTATTGGNAA
 CCCATTCCNAAAACCAAAAANGGGCCTTTTTTTTTTCCATTCCNAAAAA
 ACCAAATTTTGGCCCCCTTTTTTGGGGGGGGGAAAAAAAAAACCCNAANGG
 GGAAAAATTNTTTTTTAAAAAAA

5B *Pst*C1/E1

NNNANNTTTCCNATTCCTTGGGCGGAAATTTTTTGCCAGGGNCCGNAT
 AACCAAAGGACCCTTTTTTCNGGCCCTTAAAAAACCCAATTTNCCCCNT
 TTAATCCCCCGAATAAAAGAACCTTTCCCAAAAAAGGGNAANTTGAAN
 TGGGGGGNANCNTGGGAAATCCCAAGCCAAAAAAGGCCCAAYMTCGCCC
 WARAACRKKCCAWWAATSSSGAWAASMCYYCCAGAWARWATTKWTKRRWA
 MWRAWCYAGYWWMSCAMATCRGRTGTTWTATGGRRSSSRGWYAWWTRAA
 AARYMYTCCAWYKTKTKSSGRRTCAATKATGSSRKWYYTCAAYMTTGG
 GACTCMCYMTMCMWWTTTGAAAACCMYWATTATAKKTRTAAGSGGGCC
 AAATAATCAATGTTGGATATGGTTAAMCCGATAAAAAAAGCCTCAATAA
 ATTTTNCTGCCAACAACTAAGACAGCTCTACAATAAACATAAAAGCAATA
 ATGAGTCCCTGTGATTATTTCCCATGAAAAAACAATGGCATTTTAAATAG
 ATAGATCTCATACTGAATCGAATATTGCCATTATAGGTATATCAGGGTGT
 TTTCCGGATGCAAAAAATGTTAATGAATTTTGGGAAAATTTAAAAAATGC
 TCGTCATAGTGTTAAAGAAATTCCCTATAACCGGTCTTGGGATATTGATA
 ATTACTTTGATACTTCTTCGCAAACACATGCACAGGAATATGTAAACAA
 GGAGCATTTTTAGAAAATATCGATCTTTTTTGATCCGCTGTTTTTTAATAT
 TTCTCCGGTGAAGCAGAGCTTATGGATCCAACCTGAACGATTTTTTCCTTC
 AGGAATCCTGGAAAGCGATTGA : A : GATGCTGGTTATGATGCATCAAAC
 : TAAGTGGAACG : T : TGGGGGGTATTTGCCTGTGCAAAGGGAGACTAC
 CATGCCATTATTCACAAGCAGGATAAACTCGTATCATGACCACTGACTC
 TATGCCTCCTGCCAGGTTTGCTTATTTATTGAATTTG : : TTAGGGCCTGC
 AGTTCACGTTGATA : C : GGCTTGTTTCATC : GTCTTTGGCAGCAATTGCTT

FIG. 17B (cont'd)

ACGCATGTGATAGCCTCATTCTTAGAAATTGTGATGTTGCCATTGCAGGA
 GGTGGAAATATCAACTCAACTCCCAGCCTTTTGATCAGTTCAAGTCAACT
 TGGTTTGTGTCAAAAGATGGCCGATGTTATGCCTTSDATCAACGTGCAA
 ACGGAACGGTATTAGGGGAGGCGGTASCATCGATTATTTTAAAACCTTA
 CAACAAGCGATTGACGATGGTGATCAGGTCTACGGATTAATTAAGGGTTG
 GGGAATGAATCAARATGGAAAAACCAATGGTMTTACTGCTCCTAGTGTTA
 AGTCACAAATTCAKTTGGAAACGGATGTTTATCAAAAATTTATGATWAAT
 CCTGAACATATTACKATGGTTSMAGCCCATGGAAGTGGGACTAAACTASG
 AGATCCCATTTGAGGYTCAGGCATTAMCAGAAGCTTTTCASAAATATACTY
 AAAAAACAKGGTMTTGTGCACTAGNGTTCTTTTRAAAARWAAATATTGGAC
 ATACNTTTTTTCCCGCTGCTGGRAKTCKCTAGATGTAAATMAAGGGTTTTG
 TTGTCCATTTWCANCATTYACMARGWTTTCYYTYCRTARTTWWTAATTYW
 MAARSTATNAMTTWTTCAWWATTCTATYGTNAAWWACCCYWATTTTKKW
 KTAAMCAGCYCATWWTTWYSSSKGTMATTWNYCCNCTTTWTTTRW
 WMCCMMYTTGCGRRCSGTTTTTTTCGTKKKTGTTTCRWCAKAGAATCTM
 MMSYCCTTTTTYTYGCMMAANMRNNTTAAACMMMTWRCCTTTYTTTTRGR
 KGGSGYCCCCCNCCNGGGGGAANCCCCCAANTGGGTCCCNNTTTTGGG
 GGGGGGNTTTNGNNAANGNAAAATTTTTTTTTCATGCCCNANAAAAGG
 TCCTTCCGCAACCTTTTTTAAAAATAANCCNTCCCNAAAAANTTGGG
 NATTTGGGANTGGGAATTAAGGCCCCCTTTTTTACCCCCCGNGTTTA
 ATTTTAATTCCCCCTTTTTTGGTTCCGGGCC

5B *PstE1/A3*

NNACCAATTTTCCGAAACCCAAGNCATTTTGAAAGGGGTTTTTGGGGCCC
 GGGGTTGAAAAAAAANGGGGTTTTTTGGCCCCCCCCCENNAGNAANTA
 AAAATGGGTAAGGAACNCGCCCCCCTTTGGAAAACCTTCCCNAAAA
 AAAATAAAAAGGCNNTTTGGAATTTTTTAACNAAAATNNCGGGGGNTGGGC
 CNTTTAAANAACCCCCCNNTTTNCAAAAAATGCGARRGGKGGGYCTCCWR
 RNAYTYAAAWAWGRAMSGKTAWYTMCCWAKTGRGGGGWNTTWTATCAWT
 AAAGGNSSGGGGKTYTAWKWTTTAWRAARRGGRAGCTTTAGRAAWAWAAW
 ARWCMGTKGKKTTTAARAGARATTKWWAARRRAACTGGRWTRAAKTWWW
 RWRTTATWATANAAATRKKWAAKGGWRTATAGAGGGAAAAAATTTAAA
 GGATAAATGAARGAAACCCATCWCCATTTATTTTCCAAGASGACCAAAGA
 AATGATAGAAGTTGTAAATTTATGGRTGCGTAAAAAGAAATTTTCCCAA
 AWTTTTAAWTYCTTTGGGTAAAGGATTAAACMCTTGRTTGGAAGCAATT
 ATATGGTAAAGAACMTCCAGCTCGTATTAGTTTGCCAWGCTATCCTTTTG
 CCAAAGAGCGGTTATTGGTTGGATACTGATAAGTTAGTCGACGGTAGTTA
 TYTCAACCCTAGRCAAGAGGGAATWAATACAGATAGTGATAAGTTTGATG
 AAAAGCTTTATGAATCCTTGTTGGACAATCTTTTTTCCAAAACATGACM
 CCTGATGAAGCTATTAAGTTAATGGAAGAGGAGGTATCATGAAAAATTA
 ATTAAATTGATTTATGAAAAAGTTTTTGAAAATAAATATCAAAATCAGA

FIG. 17B (cont'd)

1

FIG. 17B (cont'd)

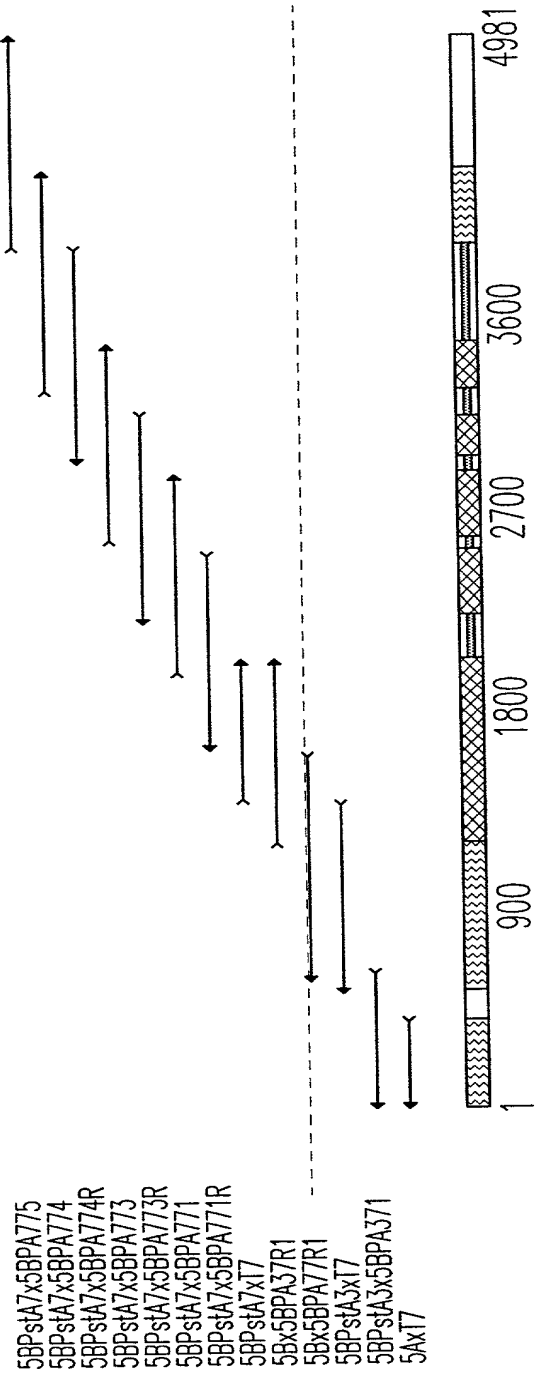


Fig. 18A

5B PstA7/5A T7 Sequence

GCACCGTTGGAACGTTATGGCATCGATTCAATTGATTGTGATTCAAGGTGAA
TCAGGCGTTGGCGGCTATTTTTTGATGCGCTGCCTAAAACACTGTTATTTG
AATATCAAACGATAGACGCGGTCTGCGCTTACTTGGTTGAGCAGCACCGC
CAGGCATGTAGGGTGTGGACGGGGTTAACGGCAACGGGTCAAGCTCAAAG
AGAGGGTGTCACTCTCTCTACCTCATCAGCGGGTGTGAACCTGTGACAC
CGAGACAGAAAGAGGGTCATCCTATACAGAAAGACATCAAGTGCCGAGAA
CACCCAGTGACAGACGAGCCTATAGCCATTATTGGTCTGAGTGGACATTA
TCCGCAAGCGAATAGTTTGGATGCGTATTGGGAAAACCTGAAGGCAGGAA
AAGATTGTATTCGTGAAATTCCCGATGACCGTTGGTCGCTAGACGGTTTTT
TTCCATGAAGATGTTGAAGAAGCGATTGCGCAAGGGAAAAGTTACAGTAA
ATGGGGCGGTTTTTTAGAGGGATTTGCTGATTTTGACCCTCTCTTTTTTA
ACCTATCGCCGCGAGAGGTGATGACGATCGATCCACAGGAGCGTTTGTTT
TTACAGAGTGCGTGGAAGCTGTGGAGGATGCCGGTTATCGCGTGCTCAG
CTTGCTTCGCAGTTTAAACAAGCGTGTGGGTGTATTTGCGGGTATTACCAA
GACGGGTTTTGATTTTTTATGGAATACAATCGGATCSAGCTSBTYT: YCGC
WT: ATACTTCCT: TTACKCCAGGTTTAAAARGCCWMGWTCAGCT: TKTTT
TSGGGTTTTTTAABTHHGCGGGKGGGTKTTTTTKVSCCVWAT: AGCA: CSG
DCGGTTTTTKMATTTTTTTAWTGGRRA: AC: : CAATCGGGATCAAC: TCT
TT: TCCGCTTATACTTCCTTTAGCTCAGTGG: : CT: AATCGTGTGTCTTT
ATTTTTTTGGGTTTACAAGGCCCAAGTC: TGT: CTATTGATACCATGTGCT
CCTCATCTTTGACGGCAATACATGAAGCCTGCGAGCATCTGCATCGCCAA
CGATGTGAACTGGCTATTGCGGGGGGAGTGAATCTTTATTTG: CACCCTT
CAACCTATATTAGATTGTGTACTTTACGGATGCTTTCCAAAGAGGGCCTG
TGCAAAAGCTTTGGTTATGGTGGTAATGGGTTTGTACCGGGAG: AGGGGG
TTGGCGCTGTGTTGTTGAAACCCTTG: : TCTAGAGCCATTCAGGATCAGG
ATAGTATATATGCCATTATTAGAGGGAGTTGTGTTAATCATGGTGGCAAA
ACCAATGGTTATACTGTGCCTAATCCACATTCTCA: AGGCGATCTTA: TT
CGTGAAGCTTTGGA: TAAAGCTCA: G: GTTAA: TGCCCGTAT: GGTCAGT
TATATAGAAGCC: CATGGTACA: GGTACAGAGTTGGGTGACC: CAATAGA
GGTAAGAGGCTTAACGCAAGCCTT: TCAACAAGATACTGATGATGTTGGT
TTTTGTGTAT: TGG: GTTCAGTTAAATCTA: ATATTGGTCATC: TGGAAG
CTGCCGCTGGTATCGCTGGGCTGAGCA: AAGTTATTCTGCAGATGAAGTA
TGAAAAAATAGTGGCAAGCCTACATGCAGAAAGACTGAATGCCAATATAA
ATTTTGAACAACTCCTTTTGTGTTGTTGAGCAATCACTTAATGAATGGGAA
AGACCAAACCTTCATGTTAATGGAAAAATCAAAGAATATCCTAGGACCGC
GGGGATCTCTTCTTTTGGTGCGGGAGGGACGAATGCACATATAATAATAC
AGGAGTATATTCAGAAGTCAGTCAGACACGACAATCAGAGGTCAGGAAT
AAACCAGCTCACCCGGTGGCCATTCTGCTATCTGCGCATACTTCCGCTCA
GTTACTGAAGATGGCCGAGGCACTTTTACTATTTATTTCGTACCATAGTGA
ATAATATGGACTCATCCTATTCGGCAGGGGATGAGATGACTCACTTGTA

FIG 18B

AATGTAGCCTATACATTACAGGTTGGACGTGAAGCTATGCAGGAACGCCT
 GGGGTTTGTGTGAATTCCTGAGTGATATTGAAGTGAACTACAAAAAT
 TTATTGATAAGGAAAATGATATTGAAGACTTTTATCGGGATCAAATCAAG
 ACTAAAAAGAAATCTCAGCTCTATTTAATTTCGGATGAAGATTTGCAGGA
 AGTGATTAAACAATGGATGCGACAAAAAAACTATCCAGGCTTTTGTAC
 TTTGGGTAAAGGGAGTTCAGTGTGATTGGAACCTTCTGTATCAACATATG
 CGAACCAAACCTTATCGGTTACATTTACCAACGTACCCATTTGCTTATAA
 TCGATATTGGATTGATGATAATAATAAAAATCAATCGACTGTAGTTGAAA
 AAACCAACACTATTATTAAAGAGAGAAAAGAGCAAGTTAGATTAGAGCCG
 CTTGATTTTTATGGAAAGGAAAAAACTTAATGTCCATGAAAAAAGCCATT
 TCATTGTTCTTTATCAACTCAATCAGAGGCCTGGTCCGGGGCGAACACTC
 AGACATCCAGTGGTAAACAAAGACGATCTTATGTACAGGTGCTTAAACAA
 GACGATATATTAAGGGATCTTAAATCAGCGCTGCCTACAGCTGTTGAAGG
 TATGATACCAACATTAAATCGAACTGGTGTGTCATGACAGAAAGCTTAAGCT
 CCTACTCAGAAGCATTTGCAAACCTATGCTGGTATGTGTGGTGGAGAAGTA
 TTGGACTTGGGGTGTGCCTATGGAATTGCAACGATTGCAGCGTTGGAGCG
 AGGGGCTCAAGTATTAGCCGTAGATATGGAGGCACAGCATCTGGAAATAT
 TATCAGACCGTATTCGGGATGAAGTGAAGTCGCGTTTATCGACACAAGTA
 GGCAAGTTGCTGGATCTTCATTTTGTATCAAGAACGTTTTTGTGCGATCCA
 TGCGAGCCGAGTGCTACACTTTTTTAAACCCACAGGATTTCCAGCAAGCAT
 TACAAAAAATGTATGGCTGGTTAAAACCCGGAGGAAAATTATTTATTGTG
 ACGGATACCCCTTATATGGGTTATTGGGCGAGCAAAGCAGGGGTTTATGA
 AACTCGTAAAGCAGCAGGGGATTTATGGCCAGGCTACATAGATAATGTTG
 GTTCTCACTTTAATACTAAAGAGATAGAAGGGGCCCAACTCTGATCAAC
 CCGATGGACCCGAAATACTGCATCGTGAATGCAAAAAATTTGGTTTTTCA
 TGTAGAAGAGACTGTTTTTTTTTGCAGGAGAAGCCTTTGCACTAAATAATA
 GTTTAGAAAAATCAGGTAGAGAGCATGTTGGTATAATAGCATTTGAAGCCG
 GAATTGGAAGATTCCGACAGGCTTGAGAAATCGCTATTGCCAGTACGGAA
 AACTGAAACGGAGAATAAGGAAATTAGCCTACTGCAAATACAGACAATGC
 TTAGGGAGAGTCTTGAATTTGAATTGGATATAGAGCCCGGTATGTTGGAT
 GAGTTAAAACCTTTTACAGATTTAGGGTTGGACTCGATAAATGGAGTCAC
 CTGGATACGAAAAATCAATAGTCACTATGGATTATCTATGACTGCGACGA
 AAGTATATGATTACCCAAATATTATTGAGTTGGCAGAGTTTTTAAGAAAA
 CAAATTATTTTGAATGATGAAAAGCAGCATCAACCATCTATATCAACAAT
 ATTTCCCACTTCATTGGATGAATTATTGAAAAAATACAAGAAGGTACTT
 TAGGGATTGAAGAAGCCGACCAATTAATTGATGAACTACCTGATTACCAT
 CTAGATATGGAACCTCATGAGTTGTTATAAGGGAAAGCGAGGTATTTTTG
 TGTACACCCGATGGATGGTAAACCATTTTGGCTGAAAAGAATTTAGCTC
 AAATCGGCGCAGCTTTGCTGCGTCCGAGTGATTTGACTTGTTATGGTGAA
 CTCAACTATGCTTGTACGGCATTTCTTACATAAGTAGGTGAAAAATGGA
 AACAAATTAGTGTAACCAATTTAGAGACAATTTGAAAAGTTTTGTAGAAC
 AAGCAGTTAGCACGCATGAGCCAATTAAAGTAACGCGCAGAGCCAGTGAG

FIG. 18B (cont'd)

GCTTTCGTCGTGATAAGTGCCGATGATTGGGAGCAAGAACAGGAAAGCCT
 TTATATTTTTTTCAGAATAGTGATTTGATGCAACAAATTGCAGATTCGCTTG
 GTACGCATACTCAGGGCAAGGGATACAAACCAACGGATAATGAGTTGAAT
 GAAATCACTGGTGCTTGAAGGCCATACCTGGGAAAAGCTGGGAAAAGCTTT
 GCGAGCAAGATAAGCGGTACACAAGGCGTTATGCAAACACTACTCAAAGAA
 ATGCTTCACTCGGAAGATCTAACCTCCGGATTAGGTAAACCTGAGCCGCT
 TAAGCATAACTTATCTGGCTTATGGTCTCGGCGCATTTTCGCAAAAAGACC
 GACTGATATATCGCTTTATTTTCGCTATCGGTGGTCACTACGATCAACAT
 TTAGTTGCCATAACGCCATAACAAGGGAAAATATGAAGCGCAGCGGAATC
 TTTTCCCTTGTGGTTACGCTTGTATAAGGTTGTTTATTCATTTAGACTC
 CCTCTGTGTTTACTGCAYTGTGTGGTAGCCAGTCCAGTCCACGTTTTTTTG
 KGGGCSRWTTTCAATGTGCTTGTATACACTTAGATGTCCGAAAAGKRAA
 MCCAMCCMCCATTGTATATTTTCTTAACTCAATGGATAAATGTTTTATA
 GCTAACTGTGAAGCTTCGATTGCCTGATTGAACTCACGATCATTTTTCTC
 TGATTTTTTCATAAAAGGCGTTAGGTGAAAATGAAGCTGGTTCTGATTTTT
 TATGTACAGCTTTATTCCTGAATCTAATTAAACCTTCATATATTGATAT
 GCTTGCTTTGATTTATCAATTTCTTTTCCAGTAATAATTTCGTGTGCAAAC
 TAGCCATTTAGAAATAATATCTAATTTATCTAAGTGCTCAACAACCGTAT
 TTGTCAGACAAAATGACGAGCAGAAAAATCWTAGACTGTATATTCTTAA
 TACWTAGAGGACAATTWTCMCACAAAAGATWTCTTGCCTCCACTGAGGCT
 ATTTCTTTTGTGKAATCTTTATCCCTAATATTTTCCCAGCTTAGTGACCA
 ATAATTTATATCATWMAGGTACTCTGTAAGCCGATAATACCTTTTGCTTA
 TATCCCAATAATTGGGACCAAAAAAGTGCAAAGCGTGGGCGCAGATCG
 AGAAATTTATTCCGTTGYGGAATAGACTATTTGCATCAATTACTGCTCAA
 WCCCGCTGAAAATTTCTGCAAATTGGTAAGGGCTTTACGTGTTTTGTCTT
 GTACAWAGCTGTTCTATTCAGCAGGAGACAAACATGGATTAGCAAGTATG
 GGTGTAGTTATCACTKAAAGAAATCATTGGCAGTATAGTCAACTCATTGA
 AAGTCCTATATTAACGTCGCCGAAAGTTAAATAGTTTTTACGATGAGATG
 TAGGCATTGTGATAAATGTGCTGCACATCATCACAATCATTCAGCATATC
 CATAAACCTCTCGAACATCTTAACATCATCTCCCGTCACTGGAGTTGTTG
 TTTGAGGAATAAATTGGATTTTCGTGACATCRRACTGAAGCTTTTCAAAG
 GCTTCAGATAACGCTTGCTTGGCCTTAAAATATTCAGTATGAGGAACCAG
 TACGCTGATCTTACCGTTTTTTGCTTCAATATCGGTGACATCCACATTTT
 CCATCATTAATGTCTCCAATACGACTTCTTCGTCAATTTCCAGTGAAAACA
 AGGATTGCACAATGATTAAACATATGGCTAACACTGCCTTGGGTACCAAT
 CTTGCTTTTGGTTTTGGTAAAACAAATACGCACATCACCGAAGGTGCGAT

FIG. 18B (cont'd)

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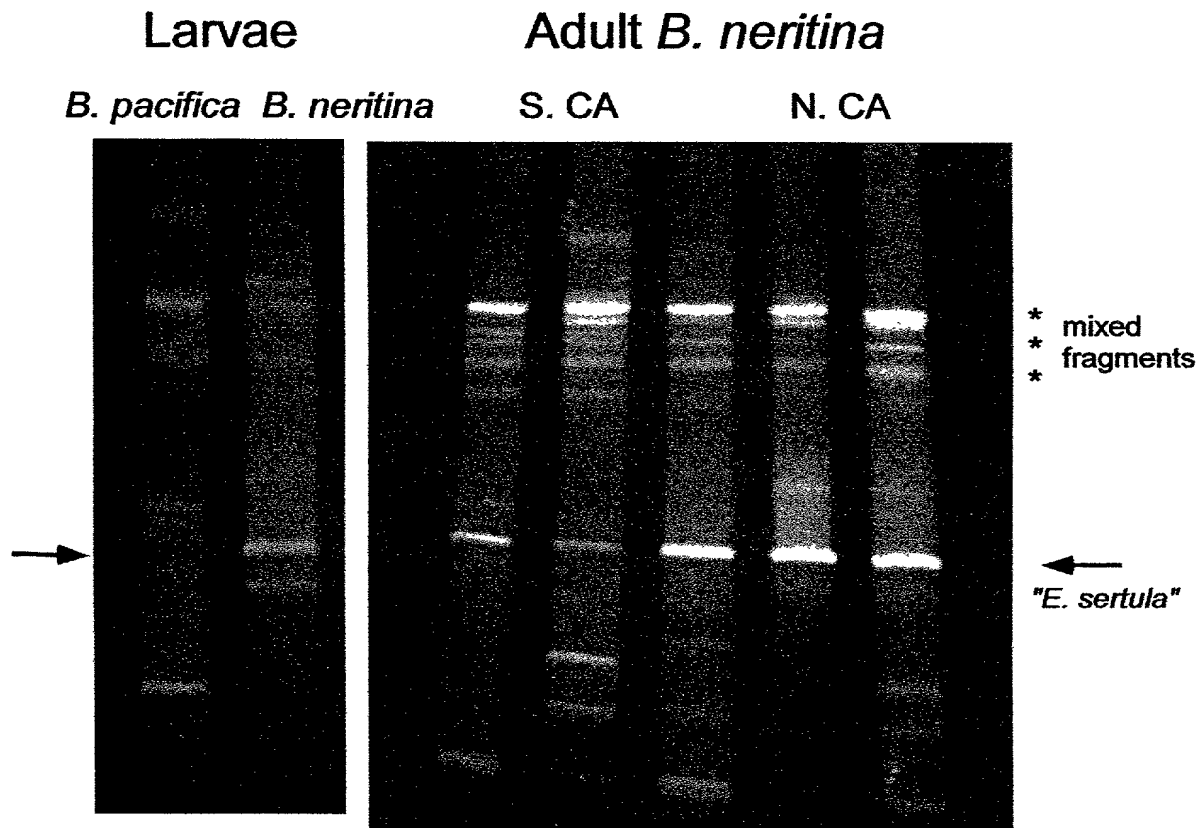
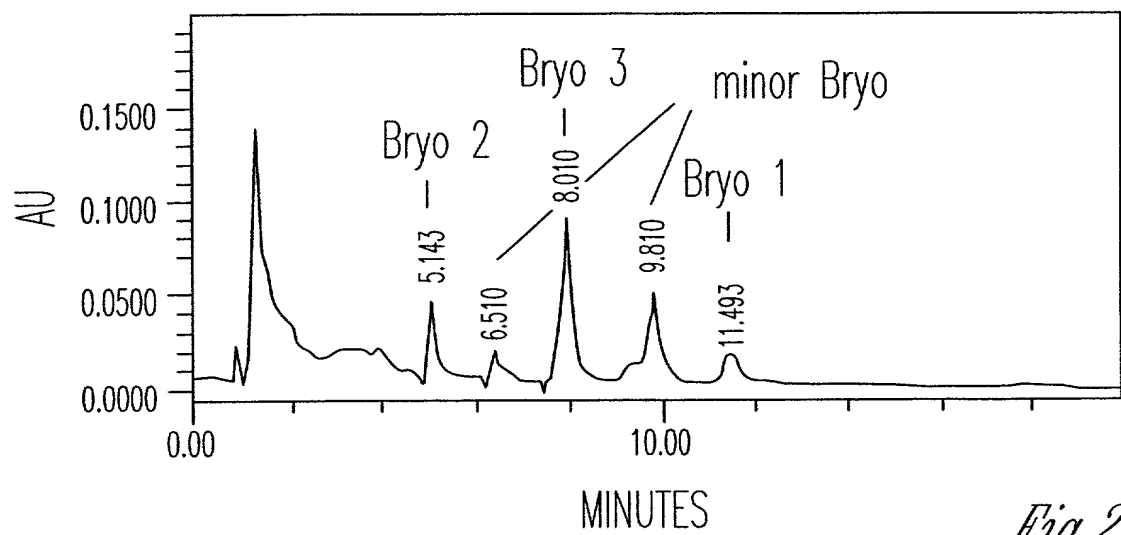
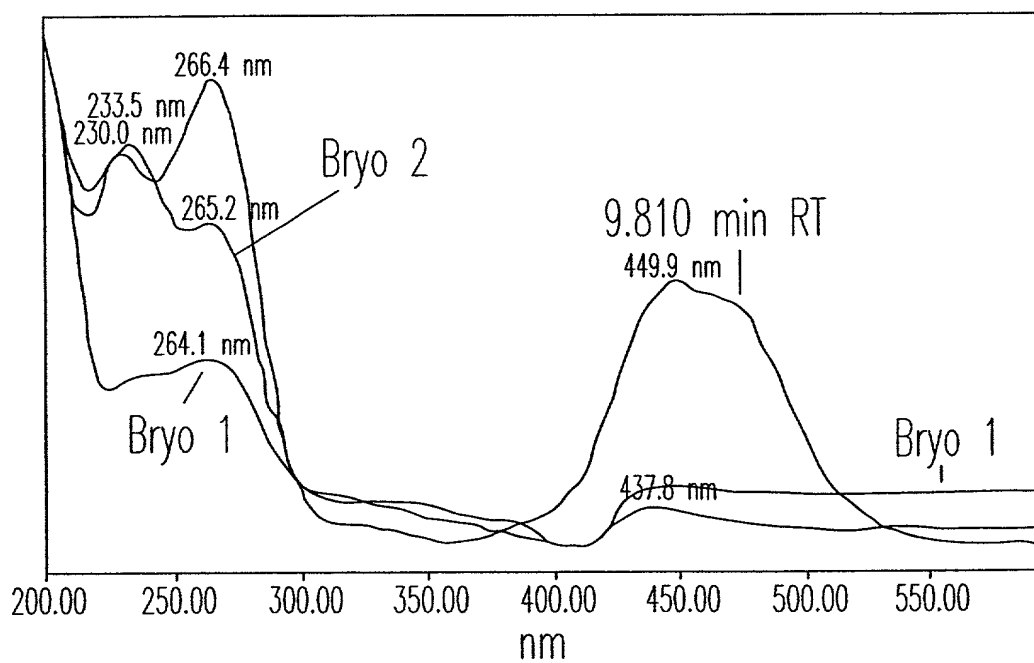
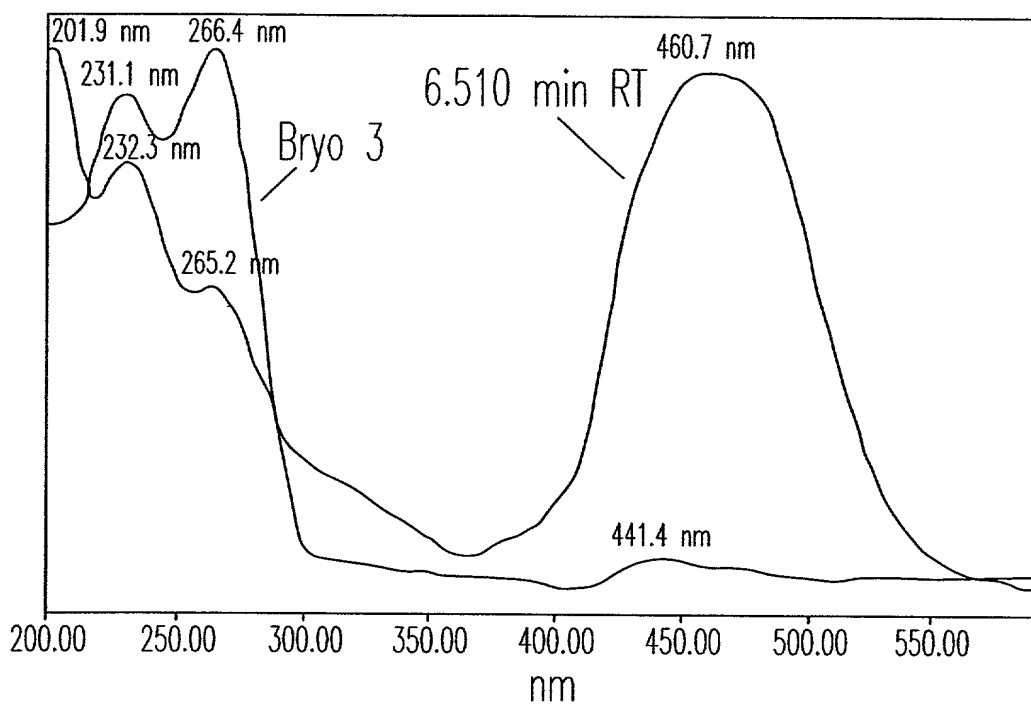
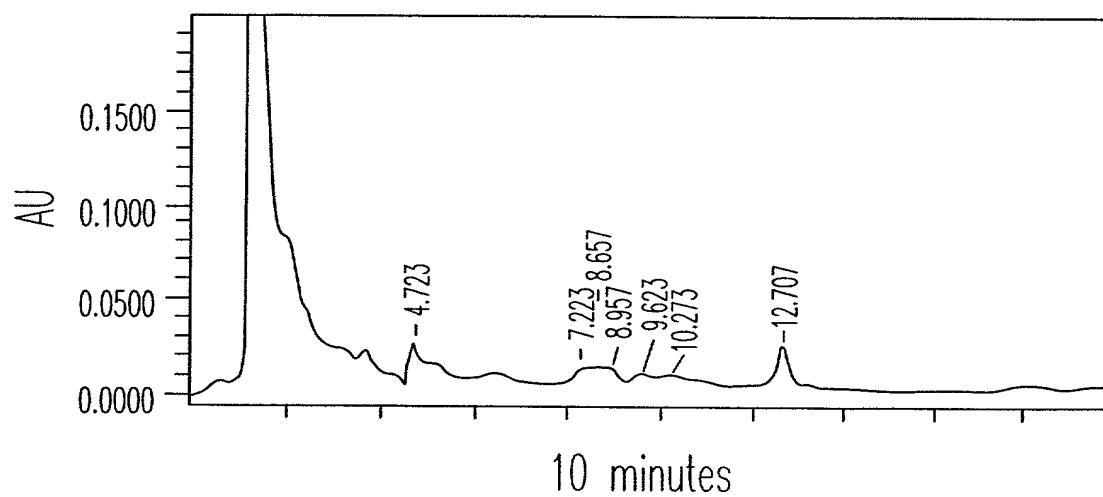
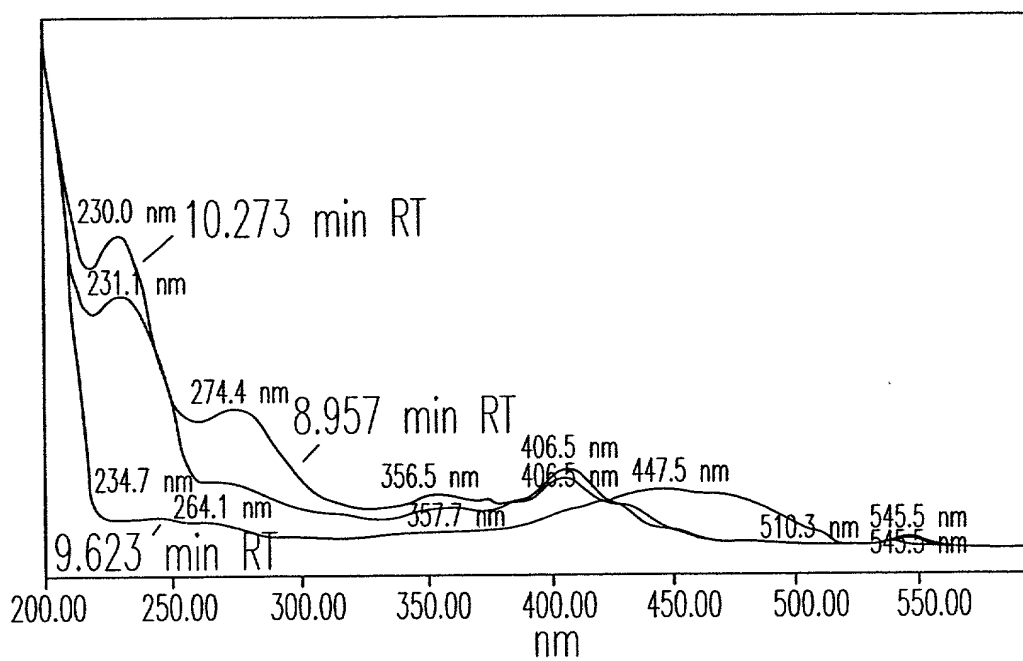
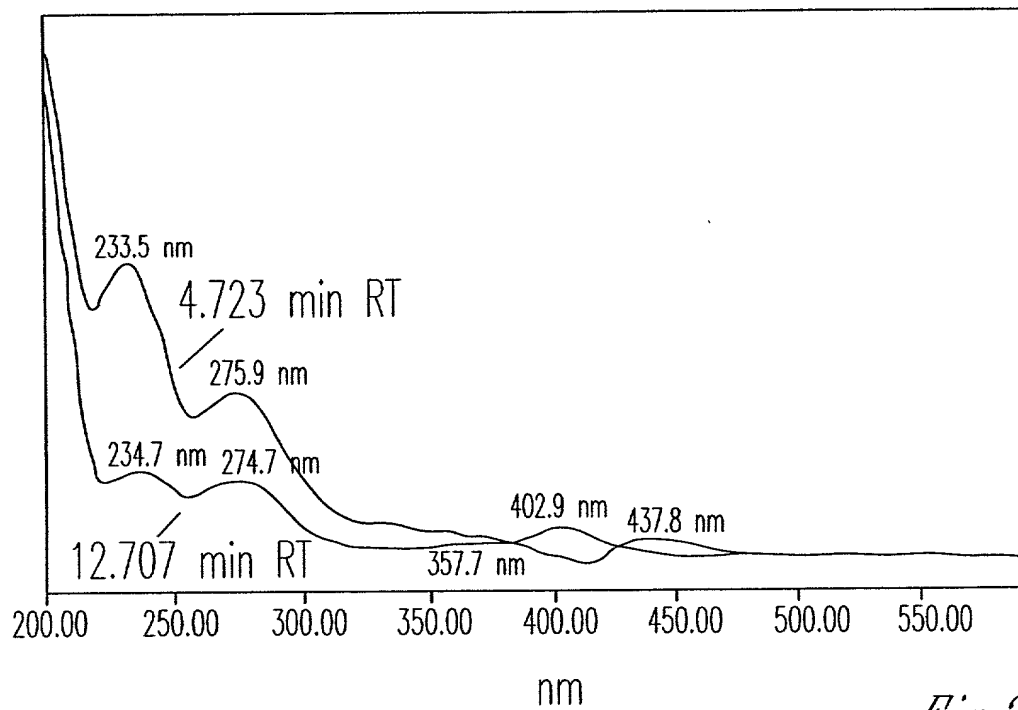
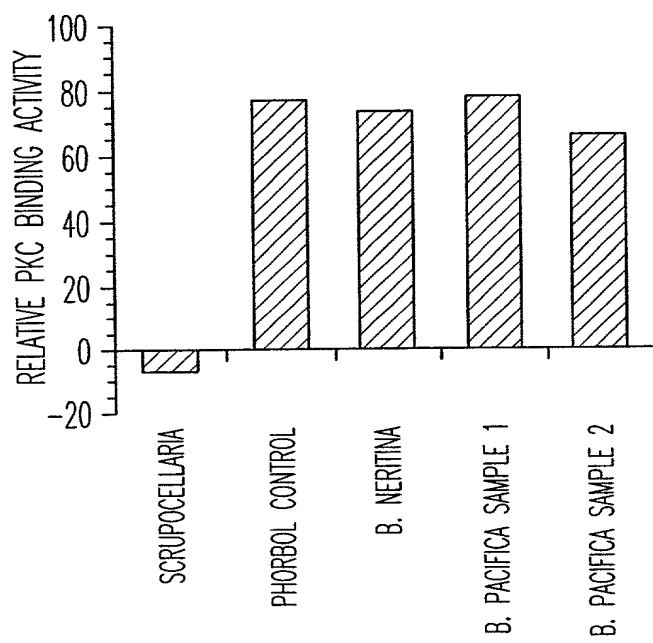


FIG. 19

*Fig. 20A**Fig. 20B*

*Fig. 20C**Fig. 20D*

*Fig. 20E**Fig. 20F*

*Fig. 21*

aaattgggtg atccgataga agtcgagaca ttggcagaat cgtttcgagt ctatacggac 60
aagcgtcatt actgtgctct ggggtcggta aaaagtaata ttggtcattt ggggtaggt 120
gctgggtag cgggcgtgac caaagtattg ttgtctttgc agcatcgcat gttaccaccg 180
acgattcatt gtgaggatgt aaaccacag attgcgttg aagtagccc cttttatatac 240
aatacgggaat taaagccttg gcagtctggt gacggtatac cagcagggc tgggtgcagt 300
tcttttgggtg tcagt 315

SEQID NO:9

FIG. 22A

aaattgggtg atccgataga agtcgagaca ttggcagaat cgtttcgagt ctatacggac 60
aagcgtcatt actgtgctct ggggtcggta aaaagtaata ttggtcattt ggggtaggt 120
gctgggtag cgggcgtgac caaagtattg ttgtctttgc agcatcgcat gttaccaccg 180
acgattcatt gtgaggatgt aaaccacag attgcgttg aagtagccc cttttatatac 240
aatacgggaat taaagccttg gcagtctggt gacggtatac cagcagggc tgggtgcagt 300
tcttttgggtg tcagtgggtac caatgcacat cttgtattag aagaatatac tcaccgagta 360
acatcaccat tacaaaaatac tattttaccc cagaacggtt tgtttattgt tccactatct 420
gcaaaaaatg atgaatgctt aaatgcttgt gtcgaacgac tgttattttt tctaaaaagc 480
aggcaatccg atacataataa aaaatattcc ttaagtata cagctcctat attgttagat 540
ttagcatata ccctccaggt cagtagggaa gcgatgacaa aacgagttgc cttttagtg 600
aaaaacaaca tagagttaat ggaaaaatta aatgcattta tagaaaaaca aaatactata 660
aaagcaagta atataaaagg ttgttactac tcttcgacta aaacatcgag tccatttgat 720
aatgaatcga ctgac 736

SEQID NO:11

FIG. 22B

cgattagggtg atccaattga attggcagca ctctcgaagg cgtttgagga gggaacacaa 60 SEQID NO:13
cgaaaacagt tttgcggtat cggttcagta aatcaata ttggtcatct ggatgttgct 120
gctggagtcg ttggtctgat caagacagca ttgtcgctgc agcaccgttt gtgcctccc 180
acgatcaact acgaagcacc caatcgggaa atcaattttg aacaatcacc ctttcatgtg 240
attgatgaac tcacggagtg gcgggggtcaa ggtggaccac ttcgtgctgg tgcagctcg 300
tttgggaattg gt 312

FIG. 22C

caattggggtg accctattga actgcaagca ctggccgatg tgtatagagt tgataactgg 60 SEQID NO:15
cgcaaaaaca cctgtgccct cggctcggtt aaagcaata ttggccatac ctctgcggcc 120
tctggtgtgg ctggtataca caaggtgctg ttatcgctta agcatcgaca attagtagcg 180
agcctgcatt ttaatagcgc caatcaccac tttgattttc aacagtcgcc tttttatgtc 240
aatacccagc taaggccctg ggatcaagca gagggactag aagaaagcgc ccgccgggct 300
gcggtcagtt cttttggtgt cagt 324

FIG. 22D

gagtatggag atccaatgga attgacgggt gcagctgccg tctttggacg aggacgaaat 60 SEQID NO:17
cagaaaaatc gtttgctggt cggatcagta aaagccaata ttagtcacct ggaagcagcc 120
gggggtatct ctggactgat caaagcagta ctggcaatgc agcatggcgt gattccacag 180
caattacact gcaaagaacc ggtccctcat atcccctgga aacgtctgcc tctcgatttg 240
gtacaagagc agactgtctg gccggaaaagt gaagagcggg tcgcggctgt aacagcgtcg 300
gattagcg 308

FIG. 22E

caacttggcg atgaaataga agttcgcgct ctgagtaaag tgtacggaga ttcacagtcc 60 *SEQID NO:19*
 acgacatacc ttggtgctgt aaaaagcaac ataggtcatg ccaacgcagg agcgggcatt 120
 gctggtttta ttaaaacggg gctgtctctt taccatggca aaattgcacc caatgcaggc 180
 aataccgagc ccaatgcagc ttggaacctt gacgcgtttc attttgcatt accaaaaact 240
 ttgcttacat ggccggagtg tgatgttcga cgggcagcga tcagctcact gggttttggg 300

FIG. 22F

gccttgggtg atcctattga atttggcgca atcaaggctg tgtatggggc tggtcggtct 60 *SEQID NO:21*
 tctccgctgg tgctcgggtg acttaaatcg aacatcgggc atttggaaag gactgcagg 120
 gttgcagctc tgattaaggc agttttgggt ctccaacatg gcgtgggtcc ggccaatttg 180
 cactgtcaca aattgaatcc gcttctggat atcgacggct tcaatgttgt gttcccgcag 240
 tctgagaccc ccttgcacag ctctctgcag ctacttggcg ggtatcagtt cgttcgggtt 300
 tggg 304

FIG. 22G

acttgggtgat ccctattgag gtggggggctc ttacagaatc atttcgatcc ctatacagaa 60 *SEQID NO:23*
 aaaaagaact actgtgcctc gggatcggta aaaagcaata tcgggcatct tttaacccgcg 120
 gccggagtat ctggagtagt caaagtgtta ctgcctttga aacataagca acttccacct 180
 tcctgtcatc tggtgaaaat caatgagcat atcaaccttg aggacagtcc attttatatc 240
 aatacggcat taaagaaatg ggaagtatcg gaaggtgagg ctgcagggc cgcagtcagc 300
 tcgtttgggt cagc 314

FIG. 22H

ccactcggcg accaatcga gatggcagca ttaaaacagg cttttgggac tcaaaagaaa 60 SEQ ID NO: 25
 aaatactgtg cgatagggtc ggtgaagagc aacattggtc atgccgatac ggcggctggc 120
 gtcgctgggtc tcatcaagac ggtgatggca ctcaaggcgc gtcagatacc gcctagcttg 180
 cactttgaga cccccaatcc gcagatcgat ttgcccgcgc gtccttttta tgtaaataca 240
 accttgaaaag attggaacac caacggtgtt ccgcgcgcgc cgggcgtgag ttcgctttggc 300
 atcggc 306

FIG. 22I

gtggtcggag atccgattga ggtcgtggga ctgacgaaag cctatcaagc gcacactcag 60 SEQ ID NO: 27
 gaacgtcaat actgcggact gggttcgggtg aagacgaata ttggccatac ggactcggct 120
 gctggcattg ctggacttct caagatcgtc atggcgatga agcatcgtca actgccgcgc 180
 agcttgaatt ttgaaacacc aaatccagac ctggatctgg agaatagtcc gttcttcac 240
 cagacgaagc tgaaggattg ggaaagtgtg gggcctcgtc gtgcgcgcgtt gagttcgttt 300
 ggtttggt 309

FIG. 22J

SEQID NO:29	60	120	180	240	300	360	420	480	540	600	660	720	780	840	900	960	1020	1080	1140	1200	1260	1320	1380	1440	1500	1560	1620	1680
	atttaattaa	ccttattgca	ccggtggggc	tcagcaccaa	ccgcgtttatt	atcgttttaa	agatgcaaac	aagatcaata	ataaatatga	gagttatcga	atataagtta	attaaatcga	gggcggtcat	taatgaagtt	acaaggttta	tcgtcaagt	aggatcatca	aaaacccaag	ctatcacagt	gacaggtggc	tgggacctcc	cttcaattat	tgtcgaatgc	agccaaggga	cagctctgcg	caataaaggt	atcaggtgat	gttacgttat

FIG. 22K

gtctctgaag gggagcatal aggtaaagtc gttgtgagtc atacagcgac agagccgatg 1740
gattgcagac agcgctgtat tgacaatgta ttgaagcaag ggcaaatggc gcccttgacc 1800
gcgacagggg gaaaaagccg ggtgtggggg ggtactggtg tcaatgacaa accgtctcct 1860
gctgttggtg tagaggagcg tttattggaa gggatagcgg tgattggtct gtcaaggccag 1920
tatccgaagt cgaagacact ggagcaattt tggcagaccc tagcggatgg agtggattgc 1980
atctcagaga ttctctgctga tcgctggtcg ttagaagagt attactcgcc aataccggaa 2040
gggggtaaaa cgtattgtaa gtggatgggt gttttggagg acatggattg ttttgatccg 2100
ttgttttttg cgatatctcc tcgggaagcg gaagtgatgg accacagca acggttattt 2160
ttagagaatg catggagttg tatagaggat gcggggatta accctaagat gttatcccgt 2220
agtcgatgtg gggtatttgt tgggtgcggt gcgaatgatt acagcgctct aatgaacagt 2280
agccactcaa cgagctctga attaatgaag gaattaggca acaactcttc cattttatct 2340
gcacgaatct cctacttttt tagtggccat tgccgagtcg tgtaatagtc ttgcgattga taccgcatgt 2400
tcttcttcat tagtgccat tagtgccatg gttgctgatg ccagggtccat cttacatat aggtttgagt 2460
ttggcgttgg caggtggagt gttgctgatg gttgctgatg ccagggtccat cttacatat aggtttgagt 2520
catggagaaa tgttatcagt agatggtcgc cggcggtgctc ttgttaaaac gcagtgcga tgcggtgcgt 2580
tttgtacctg gagagggtgt cggcggtgctc agtgatacgg ggctggggtg tgaatcagga tggtagaagt 2640
gatggtgatc ccattcgtgc agtgatacgg ggctggggtg tgaatcagga tggtagaagt 2700
aatggtatta cggcgccgag ttcaaaagcg gagcattacc ttagtgcgaag cacacggaac ggtttatcaa 2760
cgttttaata ttgatccatc cgatagaagt cgaggcattg gcagaatcgt ttcgagtcta tacggacaag 2820
ttgggtgatc cgatagaagt cgaggcattg gcagaatcgt ttcgagtcta tacggacaag 2880
cgtcattact gtgctctggg gtccggtaaaa agtaatatgg gtcaatttggg ggtaggtgct 2940
gggatagcgg gcgtgaccaa agtattgtta tctttgcagc atcgcatgtt accaccgacg 3000
attcattgtg aggatgtaaa ccacagatt gcgttggaag gttagccctt ttatatcaat 3060
acggaattaa agccttggca gtctggtgac agtataccac gacgggctgg tgtcagttct 3120
tttggattta gtggtaccaa tgcacatctt gtattggagg aatatcttcc tcaatcgaca 3180
ggaacaatag agtcgtttgc tgcgaatcat gcaagtacag ttattattcc tttgtcagcg 3240
aaaagtcata atagtttata cacatatgct caaacgctat tgatatTTTTT aaaacgtagt 3300
caggttactg acgctaaaaa aatcacata gatcacatgg aatgctcgctt gttggattta 3360

FIG. 22K (cont'd)

gcctatactt tgcaagtggg tcgagaggca atggacaaac ggataagttt tattgtcaac 3420
 acaagcaag cactcgtgga aaagctaat gcttttctag agaaggaaaa gactataaca 3480
 gactgttacc actatttatt tgatagtgac aaaccgtcta cagaaatttt ccgttttagac 3540
 gaagatgaca aagtattaat aaacagctgg ataatcaaa gtcaatatca caaattagcc 3600
 gaagcctgga gccaaggact cgatatcgac tggacgctac tctataccca ctcatcaacc 3660
 cctcgtcgca tttagcctgcc cactatccc cactatccc accgtactg gctaccagaa 3720
 aaaccacgct ataacgccc taatcatccg gtatccaacc atcaaacac cactcagaat 3780
 cactcacgct ttgccattga tacggatcac gatgtcgttg ccgagatcat gcaaaagaca 3840
 catcaacagg aactggaaca atggttatta aaactgttgt ttgtgcaatt gcaacatatg 3900
 ggattatttc aacatcgtgt ctctgagaca gcgaccgctc tacgtcaaaag tgcaggcatc 3960
 gttgataaat atgacgctg gtggcatgag tgtttaagcg ttttacagga tgcgggttat 4020
 cttgaatgga aagacgatag cgtagccgcc cacaggcat gcacaggctg tggagtctga atcgcaagag 4080
 gcatggtgga gccgatggaa cacggagtat aagcattacc agaattgatcc ggaaaaaaaag 4140
 acgttagcga tattgattaa cgattgctta caggcattac caggggtgtt aagtggtag 4200
 caattaataa cggatattat ttcccccaat ggctcgatgg agaaaaatgga aggtttatat 4260
 aaaaaataa ggattgcaga ttattgtaac cagtgtgttg gagacctgct cgtccagttt 4320
 attgaagcac gtctgtcaag agatgccaat gcgaggatac ggattatcga aattggggcc 4380
 ggtacggggg gcaccaccgc gatagtgtg ccaatgttac aagcctatca ggatcatatc 4440
 gatacgtatt gttatacggg tgtttccaaa gcctttttga tgcattggaca ggaacactac 4500
 ggcgaacaat accctatct gagttattgc ctctgtaata ttgaacagga cttagtggt 4560
 caagggaatca gcgttggtga ttatgatatt gcgatacgag ccaatgtatt acatgccacg 4620
 cggaatatat acgaaacggt cagccatgtg aggcaggcat tggcggccaa cggtttattg 4680
 attttaaatg agtttagcca aaaaagcgtt ttttcgagtg tgatatattg tttgatcgat 4740
 ggttgggcct tatctgaaga tacgggattg cgtattcctg gaagcccagg gtatatcct 4800
 aagcagtggc aagcgtact ggagcgtcg ggttttgggt acgtggaatt tccgctccat 4860
 gacgctcgtg agttgggtca acaaatcatc ctggcaacca acgcccattgc gaacgttgct 4920
 agcgtcttgc cgacatcggg gattgatcat gcccccaaga gattgccatc cgccgaggtc 4980
 agcatggatg agagagttag ccatgatgcc atgatgaagg catcgggtcaa acagttgttg 5040

FIG. 22K (cont'd)